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and Maintenance of Way

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Contents

Switch Points.

WHILE the fifteen foot switch point is standard on the majority of roads throughout the country, no doubt due to the fact that the standard rail at the time this standard was made was thirty feet, it would now seem pertinent to consider the changing of the standard switch point to 16½ feet for the use on turnouts (Nos. 7 to 12 inclusive) in keeping with the recent change in length of rail to thirty-three feet. This practice would do away with the large amount of scrap that accumulates at the frog manufacturer's plant, making use of the entire rail, as well as affording an easier angle on switch points. In the case of renewing turnouts the additional cost of substituting a 16½ ft. point for a 15 ft. is small and would be recovered by the additional rail utilized. There may be some objection to the use of 16½ ft. switch points for the many turnouts from Nos. 7 to 12 inclusive, as it is advisable to have the angle of the switch vary with the frog, but, it may be economical to use as many different turnouts, within the stated limits, as possible without sacrificing good alignment. This change would involve a slight difference in switch lead as well as switch timbers.

It would seem that this economical feature is in keeping with advanced ideas and might well receive favorable consideration in the future.

Nuts Working Loose on Track Bolts.

THE rolling motion given to the track by passing trains produces complex vibrations that tend to loosen track fastenings, nuts on track bolts, etc. With reference to the loosening of nuts on track bolts there have been a large number of remedies proposed and are still being presented, many of which are very ingenious, but many of them are rather complicated for ordinary use. The simplest and most extensively used, are the ordinary lock nut, necessitating the use of the second nut, and the spring washer. These locks are used with varied success, the spring washer being favored on some roads while the lock nut on others.

Experience has taught engineers that the cause of lock nuts working loose lies in the mass of the nut, or rather in its inertia, that is, when the track bolt is subjected to the complex vibrations, forces in the form of couples are produced that tend to loosen the nut. It has been observed that under the action of vibration, nuts have left their seats and travelled several threads out on the shank of the bolt, and occasionally fall off, which fact leads to the belief that the movement of the unrestrained nuts could only be the result of their mass relatively to the bolt and of the couple in question. Therefore the ordinary bolt having a lock nut of the same diameter is not positive, as it is subjected to vibrations under very much the same conditions as the nut proper, with nothing to prevent it from working loose at first.

The feature that makes the lock nut efficient is the forcing of the outside thread of the nut proper against the inside thread of the lock nut, thereby marring the thread. This prevents the nut leaving its seat, and uti-

lizes only that small portion of the lock nut that tends to mar the thread. The top surface of each nut as a rule is smooth to the circumference of the circle inscribed in the hexagon and when the nut is set up in the track, the smooth faces are in direct contact. Only a small portion of the force necessary to tighten the lock nut is used in marring the thread and the balance is taken up in friction between the smooth surfaces.

Therefore a greater force is necessary to spread the thread in view of the friction to be overcome.

When engineers consider it advisable to increase the size of lock nuts, the true principle has not been recognized and hence results are unsatisfactory. For the greater amount of metal in the lock-nut, the grea er the couple set up with its corresponding retarding effect.

To improve the efficiency of the lock nut, experience has taught that the surface in contact with the nut should be reduced to a minimum or to that bounded by the circumference of the thread, making it sharp, and when the two faces are forced together there is no objectionable adhesion, and all the force applied will be utilized in marring the thread. In addition to this the lock nut should be of minimum diameter and thickness, so that less energy is imparted by the vibrations to the lock nut than to the nut proper; the latter then turning back forces the threads in contact more tightly, and produces a firmer lock.

Railroad Curve Alignment.

IN aligning curves every effort should be made to secure simple curves, and when necessary to compound, the number of compounds as well as the difference in degree of curvatures should be reduced to a minimum. By studying the environments of the curve it might be well to remember that adjacent tangents, if short, might be changed and the cut or fill may be widened to suit conditions. Wherever possible all swings in short tangents should be taken out when curves are run.

It is common among many roads to spiral all curves over one degree, as well as between compound curves where the variation is greater than one degree. Good practice is where the length of spiral in feet equals the degree of curvature multiplied by one hundred for curves from one to four degrees inclusive, and the degree of curvature multiplied by fifty for curves sharper than four degrees. These lengths of spirals will be impractical in some places and in such cases a spiral of different length can be used. In selecting the spiral, the amount of work required to change the track and the speed of trains passing around curve, as well as the distance between curves should be considered.

A formula commonly used among engineers in calculating the super-elevation of curves is as follows: The super-elevation in inches equals the square of speed in miles per hour divided by one-fourth radius of curve in feet. This formula, while simple, is easy to remember and its results are in accordance with good practice. In all cases the elevation is not to exceed 7 inches. The super-elevation of outer rail should be zero at point of spiral and increase to full elevation at end of spiral. Wherever practical on curves it is recommended that the elevation be run out at the rate of one inch to every sixty feet, and the inner rail maintained at grade.

As very little attention is given to the stresses acting at railroad curves it may be of interest to mention a few of the important forces set up, in view of the fact that there are few text books in existence that treat upon this subject fully. When a train rounds a curve there are two great forces produced that tend to derailment. The in a straight line, resulting in a lateral force set up befirst of these is the tendency of the wheels to continue tween the flange of the outer wheel and the ball of rail causing the wheel to slide laterally. The outer wheels on the truck advancing around a curve slide longitudinally an amount equal to the difference in length of inner and outer rails. The outer wheel flange on the first pair of wheels guide the truck around the curve, this being true whether the truck has two or more pair of wheels.

The other important force acting is the resistance offered the truck in turning, by friction at the center plates and side bearings, as it is necessary for the truck to turn at an angle with respect to the body upon entering a curve. The truck again returns to its original position when on tangent. This force varies widely in accordance with the load placed upon the truck, and the newness of equipment. When the curve is sharp or the friction exceptionally large, it is not uncommon to have the wheel flange bear against the outer rail over the entire curve.

It is these important forces, and not so much the centrifugal force, that causes train resistance on curves, and the wear on outside rail. Trains upon their movements around curves are subjec:ed to a large amount of impact, shock and oscillation, a greater part of which is reduced to a minimum on well adjusted transition curves.

It will be understood that this is only a small part of this large field and is presented in the hopes of arousing continued discusion.

Standardization.

ON the majority of railroads, engineering standardization is gradually gaining favor. Standardization eventually results in the adoption of definite designs of equipment and structures which are to be used on future new work. This is more noticeable with the permanent structural work. Drawings for the various standards, which may represent designs of turntables, coal chutes or other equipment, are generally made up for approval by one or more officials of the road. After the design of a standard has been checked and approved, it is distributed to the various district engineers over the system, with instructions to follow these plans in the future. Accompanying such instructions will be definite directions to be followed.

Having approved of such a set of drawings and later on seeing the finished device in successful operation, officials seem somewhat inclined to discourage changes not in keeping with the adopted standard. Of course there is much convenience in adhering closely to a standard, inasmuch as all similar parts in the different

structures are of the same size and are interchangeable. In case of a break, the broken part or parts may be ordered direct from the general store keeper, and this is a factor of no small importance and convenience in railroad operation and maintenance.

On the other hand the practice of standardization on railroads has a tendency to discourage new men and new ideas. Unvarying uniformity in all work, as well as following a certain class of drawings, breeds disinterest and monotony. The absence of real competition has the same influence in railroad engineering that it has in any other pursuit.

A railroad engineer who is in charge of a particular line of work, naturally picks up new ideas from time to time that may be developed to the advantage of the company by which he is employed. However, if absolute adherence to adopted standards is so followed that such development is discouraged and frowned upon, there will be no encouragement to develop and originate new designs. Such discouragement naturally tends to deprive the engineering world of the experience and observations of many practical and capable men who would otherwise be alive to opportunities beneficial to the service.

Recommendations are some times submitted which would seem to include ideas worthy of consideration, but which are refused because they embody changes in conflict with existing standards. This may be done in a manner which would carry the impression that the ideas presented do not represent good practice, or that present standards would not be improved by the changes recommended. At the same time selfish motives sometimes influence such determinations and if this is suspected the discouragement produced is even more marked.

Suggestions for improvements result from a natural desire to benefit the service and are not prompted by mercenary motives. Encouragement not only tends to produce loyalty in each individual member of the organization but leads to the improvement of the entire force. One engineer will not be inclined to develop improvements when the experience of a co-worker leads him to believe that the opinions of his superiors are biased by an over estimate of the importance of existing standards.

While the merits of standardization are duly appreciated, and while the adoption of standards tend to reduce maintenance costs, care should be exercised to prevent the adherence to standards from interfering with progress and development.

The Chicago Terminal District Telephone System of th Rock Island Railroad.

By J. C. Kelsey.

RAILROAD men are necessarily conservative,—the result of their occupation. They are also courageous men, for every year they suffer as many fatalities as at Gettysburg, and resignations are few. They are kindly men. Witness how they cheerfully answer thousands of questions, wise and foolish, and how tenderly the lame, halt and blind are taken on and off the daily trains. They exemplify the biblical story of faith, for they depend upon the telegraph, and trust that their swiftly moving trains will be guided from terminus to terminus with safety and despatch.

The telegraph system of the railroad composes the nerves of the road. All railroad men trust its orders and have faith in its simplicity and exactness, for they have given it a life-long trial. Therefore, it will never do for the telephone to be placed before a railroad man as a

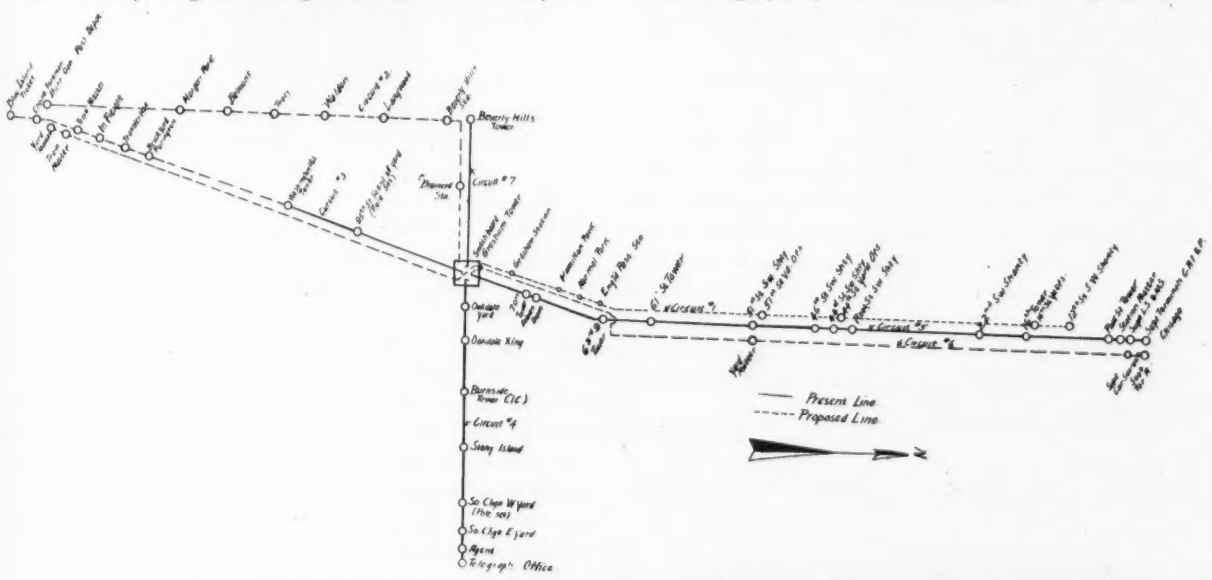


DIAGRAM OF WIRING OF TELEPHONE SYSTEM AT CHICAGO TERMINAL DISTRICT, ROCK ISLAND RAILROAD.

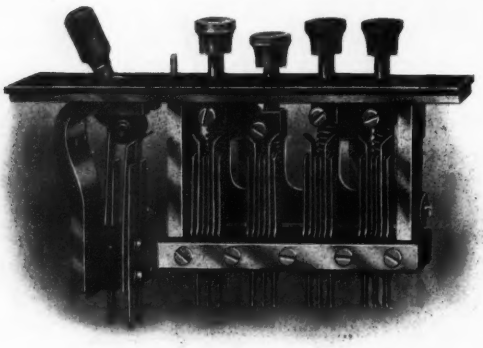


FIG. 1. KEY INSTALLATION.

competitor of the telegraph.

The telephone is not a competitor of the telegraph. It is but a natural aid to the telegraph department, and easily relieves it from the usual deluge of work. There are ever so many places about a great railroad yard which should be easily and instantly accessible to the terminal superintendent, and which do not merit the employment of a specially trained telegraph operator. It is at these places that the telephone comes into its natural place.

A yardmaster desires to call a yard office. His time is precious. He uses the telephone and in a few seconds his orders are being executed.

A suburban train is late. The passengers are depending upon quick steam service to reach their offices on time. No telegraph office is available. The passengers would like to know how late the train is, so they can use their best judgment on waiting or taking the slower electric service in a desperate effort to get to work on time. A telephone in the suburban ticket office will easily furnish the information, and much discontent due to late trains will be palliated.

Certainly no other device can excel or equal the telephone from the standpoint of time economy. Time is money and the time saved in a great terminal yard by a telephone will surprise the most sanguine telephone man.

The Rock Island Terminal District is a very large and comprehensive area. It extends north and south from LaSalle Street to Blue Island and shares with the Lake Shore Railway system the district from LaSalle Street to Englewood, and from Englewood to South Chicago.

The suburban district extends from Englewood and South Englewood to Beverly Hills and south along Belmont, Morgan Park and Burr Oak.

The central point is at South Englewood, or Gresham, as this station is now called. In the Gresham tower is placed the central exchange switchboard. In this tower there is a storage battery, which furnishes battery current for the telegraph service. These batteries are used to operate the switchboard and telephones of the terminal system. This switchboard has a capacity of ten common battery lines and ten magneto lines. This present equipment is five common battery lamp signal lines, and five magneto drop signals, both wired for night bell service. However busy the operator may be upon other duties no call made can fail of recognition.

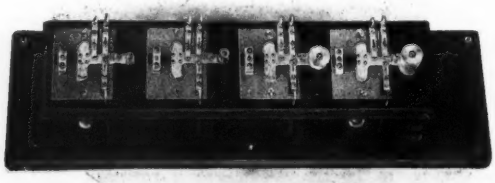


FIG. 3. FOUR FREQUENCY POLE CHANGES.

There are seven copper line circuits entering the Gresham office. Of these four are common battery, eight party selective lines and three are non-selective magneto lines.

Circuit No. 1 comprises Gresham ticket office, Hamilton Park ticket office, Normal Park ticket office, Englewood ticket office, 51st Street yard office, 44th Street yard office, 16th Street yard office, and the 12th Street switch shanty. These eight telephones are of the common battery selective type, simply signalling central by removing the receiver. The operator may select any of the eight stations without interference. This system is known as the Kellogg Harmonic Selective System.

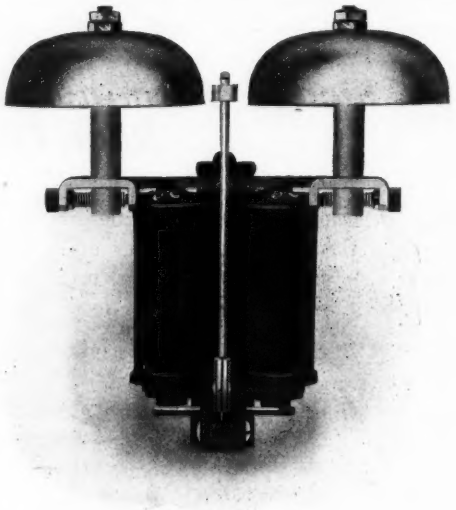


FIG. 2. HARMONIC RINGER.

Circuit No. 2 takes in the suburban ticket offices,—Brainerd, Beverly Hills, Longwood, Walden, Tracy, Belmont, Morgan Park, and Burr Oak. This line is also selective common battery of No. 12 copper.

Circuit No. 3 takes in the main line of the Rock Island main line from Gresham to Blue Island. The first station is at 95th Street and is a pole set, accessible to the train men and yard men. The other seven stations are Washington Heights Tower, switch tender at brick yard, transfer house, "In Freight" office, Train Master's office, Mr. Brue, Round House foreman, and Blue Island ticket office.

Circuit No. 4 comprises eight selective common battery stations, and extends from Gresham to South Chicago. The stations are Oakdale yard, Oakdale crossing, Burnside tower, Stony Island, South Chicago west yard, South Chicago east yard, agent at South Chicago and telegraph office.

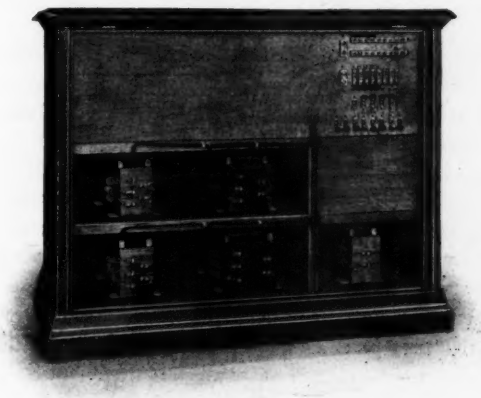


FIG. 4. FOUR FREQUENCY POLE CHANGES.

Circuit No. 5 reaches from Gresham northward through Englewood and to the LaSalle Street station. The equipment consists of fourteen magneto non-selective stations, including 79th Street tower, Auburn Park depot, 65th Street tower, 61st Street tower, 51st Street switch shanty, 46th Street switch shanty, 44th Street switch shanty, Root Street switch shanty, 22nd Street switch shanty, 16th Street tower, Polk Street tower, LaSalle Street station master and superintendents of Lake Shore and Rock Island terminals. These telephones are of Kellogg make, having four bar generators and 1,600 ohm ringers.

Circuit No. 6 is a private line and connects with the Gresham exchange. This circuit is arranged so that the five private parties can signal the Gresham exchange when they want it. Normal operation of the line does not affect the exchange drop. This is accomplished by the Kellogg push button telephone. The exchange drop is legged to ground on one side of the circuit. The depression of the telephone push button legs the normally bridged generator to ground, and completes the ringing circuit through the exchange drop. This private line extends from LaSalle Street station to Burr Oak, and includes the terminal superintendent's offices at LaSalle Station, 51st Street yard master, and both yard masters at Burr Oak.

Circuit No. 7 connects Beverly Hills tower and is the only single line telephone in the system. The line terminates in a drop at the Gresham office.

The switchboard consists of a Kellogg No. 440 cabinet, equipped with five common battery and five magneto lines. There are five combination cord circuits, so arranged that any connection may be made, whether it be common battery to common battery, common battery to magneto, or magneto to magneto.

Each cord circuit is equipped with a master key and four party ringing key. Fig. 1 illustrates the key method of impressing any one of the eight selective currents upon the line.

The Kellogg harmonic selective service is accomplished by the use of four frequencies of electrical currents, 16 2-3, 331-3, 50 and 66 2-3 cycles. The lower frequency, 16 2-3 cycles per second is the normal speed of ringing currents, accomplished by the ordinary hand generator.

The harmonic ringer, Fig. 2, is simply a polarized ringer, of the usual type, except that the lever carrying the tapper is a steel spring. The frequency to which such a ringer will respond depends upon the stiffness of the spring, and the weight of the tapper. The larger the tapper, the slower will be the responsive frequency. These ringers are adjusted in the factory, and need very little attention after being put into operation.

The feature of the system is the Kellogg four frequency pole changer, shown in figures 3 and 4. This device changes 22 volts of direct current into four frequencies of alternating current by means of interruptors and transformers. A very small amount of current is consumed and this device recommends itself to all concerned in economics.

Each telephone is protected by a Chapman arrester, shown in figures 5 and 6. This device is furnished by the Kellogg Company and is peculiarly desirable arrester, because it is practically self cleaned and automatic in ridding itself of arcs. It also carries off static charges and should be very efficient for telegraph work. These arresters are placed on the cross arm at each telephone drop wire, so that heavy charges may be dissipated to earth before entering the building.

Line circuits are of No. 12 copper and all drops to the instruments are of twisted No. 12 copper. Between the drop wires, and the inside wires are placed tubular line fuses for extra safety precautions. It is believed that not only will the eight party telephone line instruments with

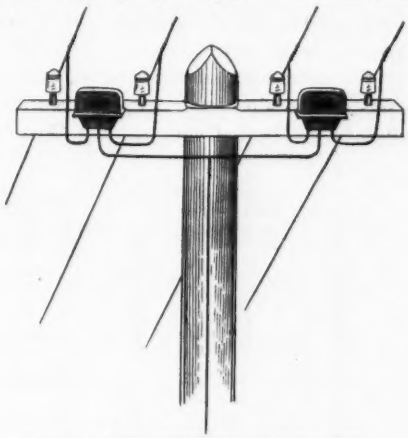


FIG. 5. FOUR FREQUENCY POLE CHANGES.

eight Chapman arresters be effectually protected but the poles as well.

By this arrangement of circuits, thirty-two common battery telephones and twenty magneto telephones will give most satisfactory service over practically but six pairs of wires. Four circuits contain thirty-two selective telephones, one circuit contains fourteen non-selective magneto telephones, another contains five non-selective magneto push button telephones, while still another has one non-selective station at Beverly Hills.

Under no other condition than by selective harmonic ringing can so many telephones be so successfully handled over so few lines.

Full credit for the adoption of this system is due Mr. J. G. Jennings, Superintendent of Telegraph of the Rock Island System. Mr. Jennings conceived the idea of keeping the suburban patrons fully informed as to the time

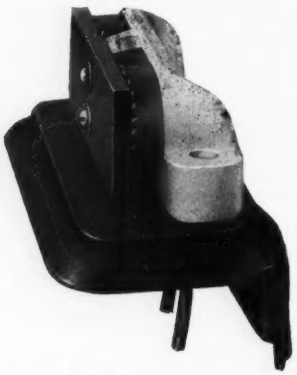


FIG. 6. CHAPMAN LIGHTNING ARRESTER.

of their trains, and this accomplishment will add greatly to the popularity of the service. Not only will this feature be of a great gain to the road, but the telephone accessibility of all the terminal offices will save many valuable hours to the railroad company.

Concrete Piles.

While the wooden pile has provided a good foundation for railroad trestles in the past and will no doubt continue so for some time to come it seems probable as the demand is so great and the supply of timber apparently decreasing that other material will eventually have to be used. Among the substitutes that are continually being tried is concrete and is made possible by using a temporary sheet iron or wooden mold. This material in many cases has given satisfaction but has not as yet reached that state of satisfaction where it can displace the well tried wooden pile. The average cost of constructing a concrete pile on the ground is about 80 cents and upward, and in large quantities this figure can be reduced considerably. As a rule the concrete pile is made of uniform section, of about 16 inches in diameter, the full length and does not taper toward the head like an ordinary wooden pile. This allows of a larger base for bearing surface.

The average load, calculated for a concrete pile to carry is from 20 to 30 tons. This variation depends largely on the soil whether rock or unstable soil. Head of piles can be capped with metal as desired to fit conditions.

New Roundhouse at Oneonta, N. Y.

Delaware & Hudson Co.

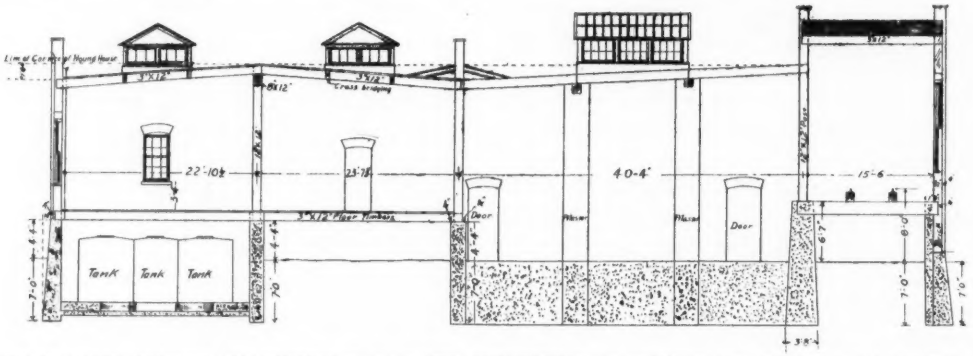
[*Concluded from previous issue.*]

THE walls of the roundhouse are of brick 12 inches thick, and 20 inches thick through pilasters, and are supported on concrete foundations 7 feet deep. The outside windows are large and arranged in sets of three for each stall. On both sides of the lantern, windows are placed in sets of two alternately with the ventilator.

The buildings are heated with the hot blast ventilating system manufactured by the Pittsburgh Stoker Company. The fan is of the three-quarter housed steel plate type, 10 feet in diameter, delivering 103,000 cubic feet of air per minute when operated at 140 revolutions. The fan discharges direct into the main distributing conduit which is laid next to the outside wall of the roundhouse.

The conduit is of rectangular section with walls of concrete, the foundation of the roundhouse making the outer wall. The floor of the roundhouse above the large section of conduit is arched concrete supported by two 12 inch I beams, 8 feet 10 inches long, set in pairs 4 feet 11 inches from center to center, and by 80 pound steel rails spaced at various intervals. Over the smaller sections of the floor is flat concrete construction supported by 80 pound steel rails.

At the point of discharge from the fan the conduit



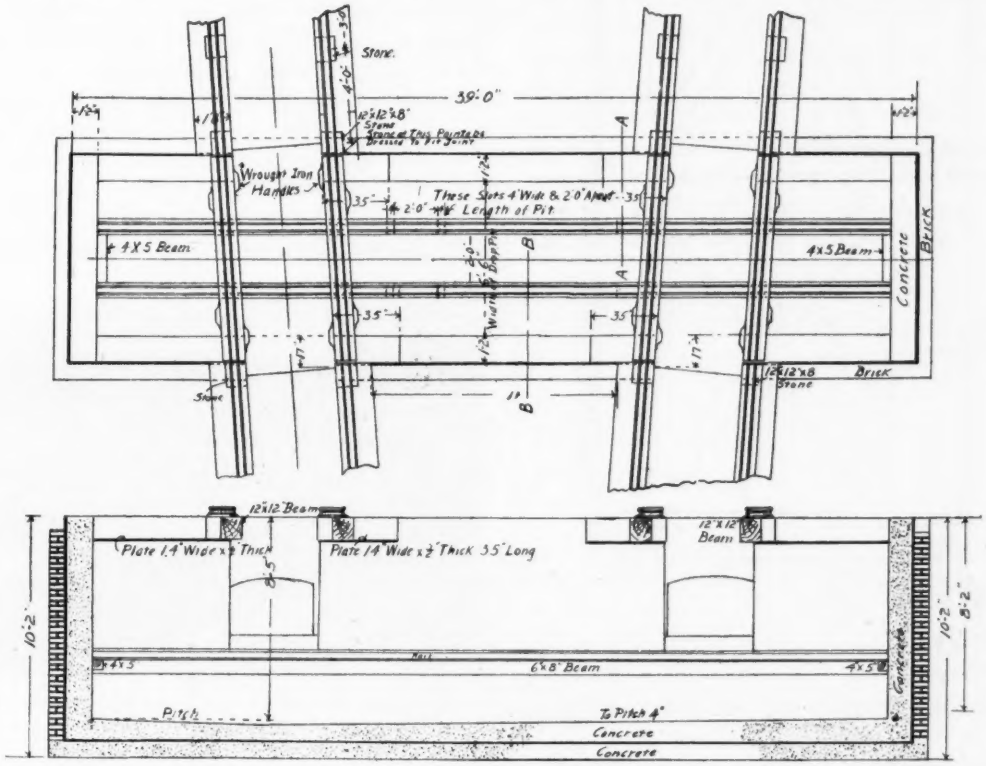
CROSS SECTION OF ANNEX, SHOWING ARRANGEMENT OF OIL TANKS, CONSTRUCTION OF BUILDING AND ELEVATED COAL TRESTLE, ONEONTA ROUNDHOUSE.—D. & H.

is 5 feet 6 inches high and 7 feet 8 inches wide. The section decreases gradually around the circle both ways to a point 180 degrees from the discharge opening, where it is 3 feet high and 2 feet 6 inches wide. A damper is located at this point. Between each pit an 18 inch iron pipe is run from the conduit at an angle which will offer little resistance to the current of air and is branched into two 12 inch pipes that deliver the air to adjacent pits. The delivery pipes enter the pits from opposite sides

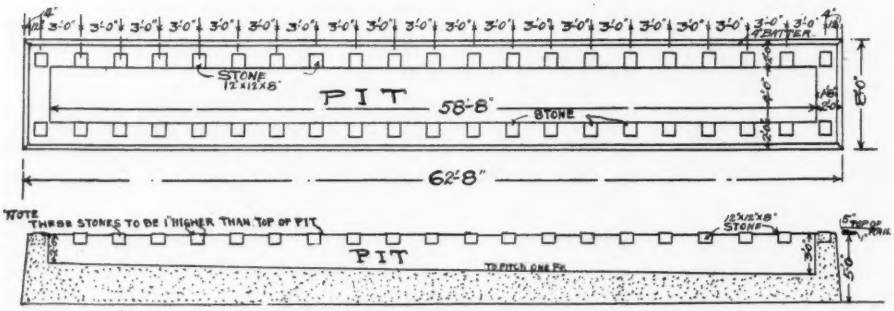
VIEW OF ROUNDHOUSE, SHOWING END WALL AND GENERAL CONSTRUCTION. THE ELECTRICALLY OPERATED TURNTABLE WITH CONCRETE PIT. ONEONTA, N. Y.,—D. & H. CO.

at points 16 feet apart, thus distributing the heat generally under the engines. Ten manholes offer convenient access to the conduit.

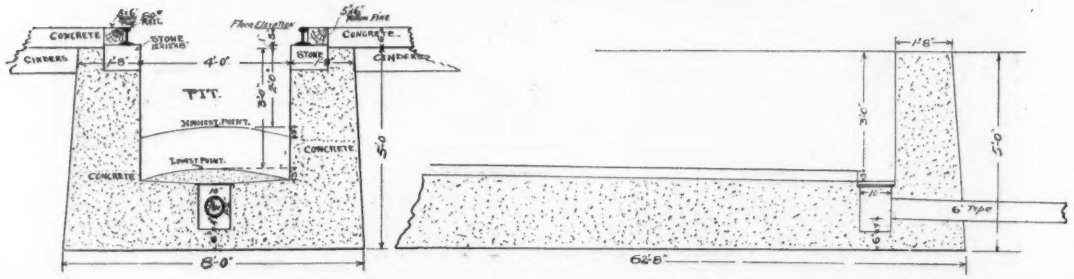
Drainage is accomplished by a system of iron and vitrified piping laid from the various buildings to a nearby creek. A 4 inch drain pipe is run from each pit to a 12 inch line of vitrified pipe laid in a circle of 108 feet radius from the center of turntable pit. From the inner roof gutter 4 inch iron drain pipes are extended, every 2 or 3 stalls, and merged with the 4 inch pit drainage pipes into 6 inch vitrified pipes. Eight inch pipes are laid from the turntable pit, machine shop and toilet room to the 12



PLAN AND LONGITUDINAL SECTION OF DROP PIT, ONEONTA ROUNDHOUSE.—D. & H. CO.



PLAN AND LONGITUDINAL SECTION OF REPAIR PIT, ONEONTA ROUNDHOUSE.—D. & H. CO.



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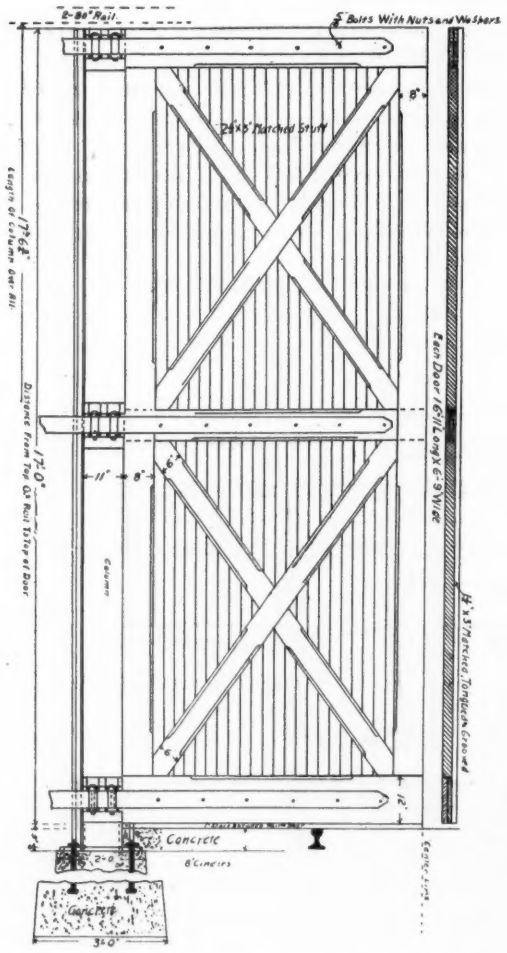
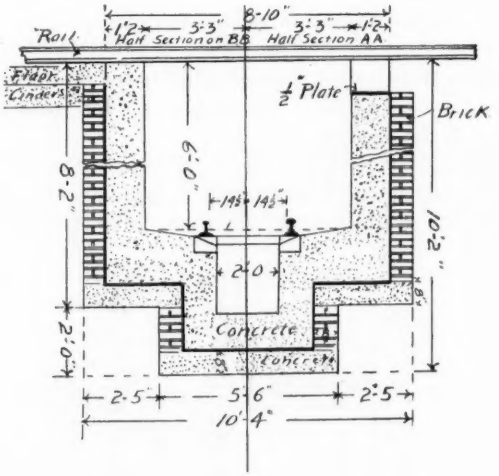
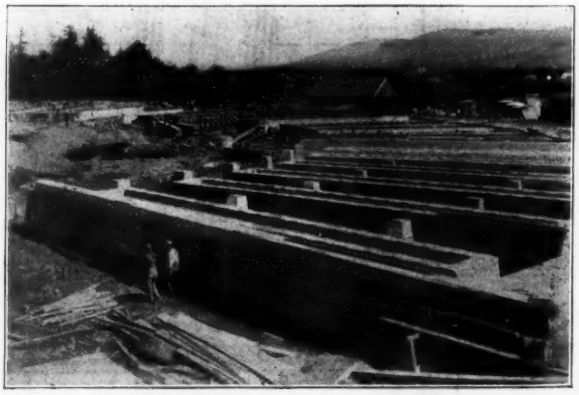


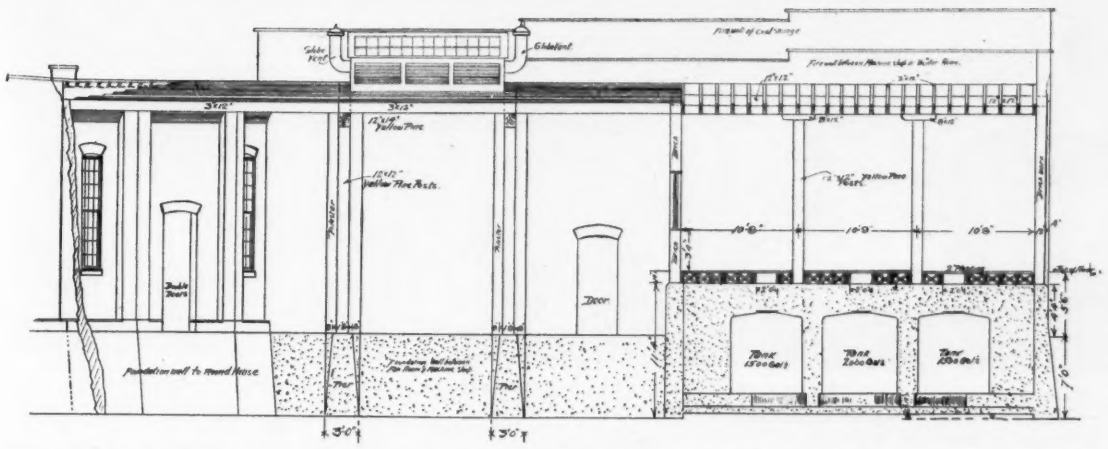
PLAN AND SECTION OF ROUNDHOUSE DOOR, ONEONTA ROUNDHOUSE, —D. & H. CO.



TRANSVERSE SECTION OF DROP PIT, ONEONTA ROUNDHOUSE. —D. & H. CO.



VIEW SHOWING DEPTH OF CONCRETE FOUNDATION, ONEONTA ROUNDHOUSE. —D. & H. CO.



SECTION THROUGH STORE ROOM AND OIL HOUSE, SHOWING CONSTRUCTION AND CONCRETE FOUNDATION, ONEONTA ROUNDHOUSE,—D. & H. CO.

inch pipe just mentioned, which in turn enters a 24 inch iron main that delivers the sewage to the creek. A 6 inch vitrified pipe drains the cinder pit direct to the creek. In carrying the drainage from the roof down pipes inside the roundhouse to the sewer, the forming of ice in front of the doors with their consequent freezing to the rails is avoided, which is an important item in the operation of the roundhouse in winter. Seven manholes are placed at various points in the sewerage system.

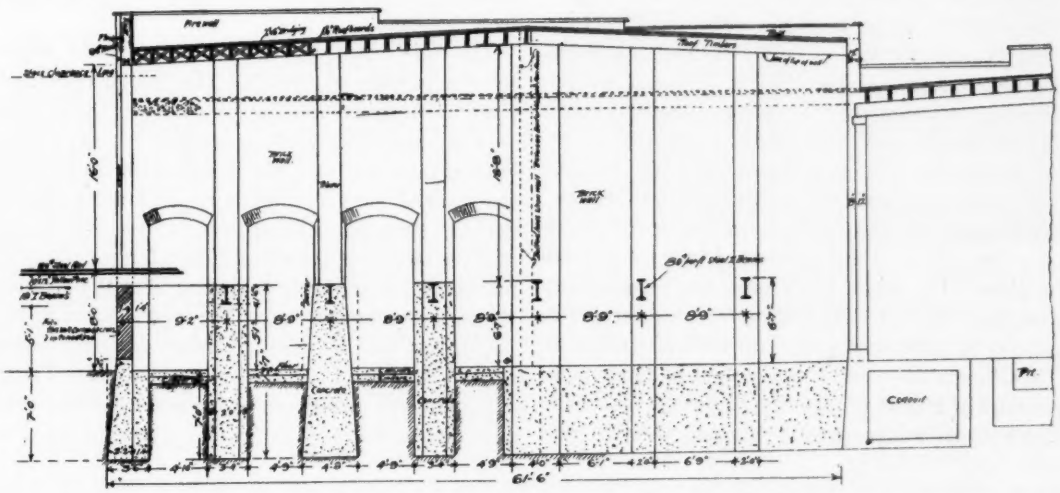
Water is supplied from a well consisting of ten 2 inch pipes driven 25 feet in the ground and brought together at the surface and coupled to a 6 inch Worthington pump which furnishes 450,000 gallons of water every 24 hours. Two 80,000 gallon tanks are provided for storage and supplying engines direct. The high pressure pump has an 8 inch discharge connected to a short section of 8 inch pipe from which are tapped the various supply lines of the water system. The roundhouse is supplied with a 6 inch pipe laid in the conduit from which runs a 4 inch distributing pipe about the center of the house and with 2 inch laterals between every 2 pits.

The annex containing the machine shop, store room, fan room and boiler room is built adjacent to the roundhouse. The foundations are of concrete 7 feet deep, the walls are of brick and after the same design as the roundhouse. The roof is of low pitch and covered with slag roofing laid under the specification referred to previously. Skylights and ventilators are placed over the machine shop and boiler room. The floors are of wood and concrete.

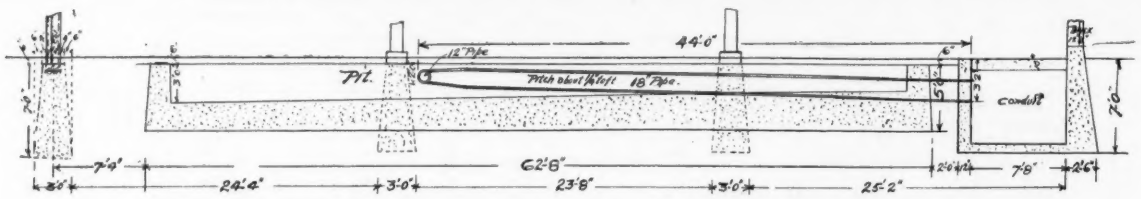
In one end of the building and next to the boiler room is placed the coal storage with a capacity of 152 tons. A standard gauge track extends the length of this room for receiving coal cars enabling the coal to be handled direct from the cars to the boilers. It stands 8 feet above the floor and is supported by 18 inch I beams which rest on concrete piers.

In the boiler room 3 boilers are installed, which are of the tubular type, 152 horse-power and furnished by the Franklin Boiler Works, Troy, N. Y.

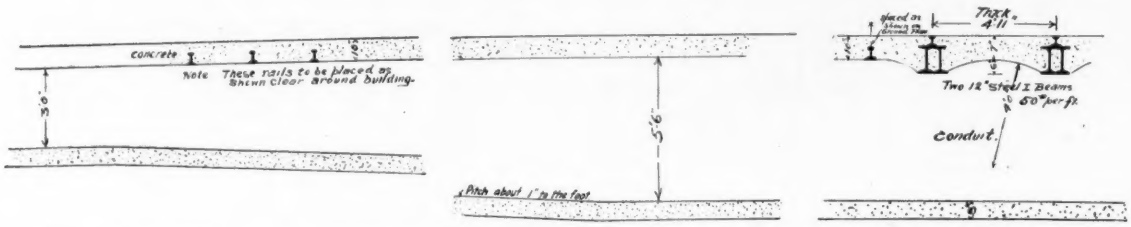
The fan room contains the large fan for heating which has been previously described, and the high and low pressure pumps. Immediately adjoining the fan room is the machine shop, which is in direct communication with the roundhouse. It is of ample size to accommodate the machinery necessary for the roundhouse which it serves. The store house adjoins the machine shop and is arranged both for the storage of oil and supplies. The floor is 5 feet 6 inches above that of the machine shop and is constructed of 2 inch planking. Five oil tanks, one



SECTION THROUGH COAL STORAGE ROOM, SHOWING CONCRETE PIERS AND I BEAM SUPPORTS FOR TRESTLE, ONEONTA ROUNDHOUSE,—D. & H. CO.



LONGITUDINAL SECTION OF REPAIR PIT SHOWING HEATING CONDUIT, ONEONTA ROUNDHOUSE.—D. & H. CO.



LODGITUDINAL SECTION THROUGH HEATING CONDUIT, SHOWING METHOD OF REINFORCING, ONEONTA ROUNDHOUSE.—D. & H. CO.

of 2,000 gallons capacity and four of 1,500 gallons capacity each are placed in an excavation 10 feet 6 inches below the floor of the storage room. The room has concrete walls and floor and is fitted with a large door and three windows.

The Bowser system of oil distribution is installed in the oil house. Pipes are run from each tank to a circular stand on the floor above and the oil pumped up when needed. Delivery of oil and supplies is effected over a counter and by means of a window in the wall between store room and machine shop.

We acknowledge the courtesy of Mr. J. H. Manning, superintendent of motive power and Mr. James Mac-Martin, chief engineer, for the illustrations presented.

Pennsylvania Railroad Improvement Between Philadelphia and Baltimore.

THE Pennsylvania Railroad has recently completed extensive improvements on their main line between Philadelphia and Baltimore, eliminating several bad curves and renewing the bridge over the Susquehanna River.

An important link in this great chain of betterment is rebuilding a portion of the roadway on the main line of the Philadelphia, Baltimore and Washington Railroad centering at Harve de Grace, Md., at the mouth of the Susquehanna River and extending from Principio on the north to Oakington, Md., on the south, a distance of 5½ miles. The rebuilt line is considerably shorter and is a step toward eventually reducing the running time between New York and Washington to four hours without sacrificing the slightest element of safety. The changing of the roadbed, not including the Susquehanna River bridge. required the use of some 30,000 cubic yards of masonry and the excavation of 745,000 cubic yards of dirt and Alleghany Mountain sandstone, with granite bridge seats, in eliminating grade crossings and erecting several small bridges. The improved line consists of four tracks with the exception of a single track over the Susquehanna River bridge. The road was built to serve its purpose at a small cost of maintenance, for an indefinite period of time. All the main line curves are reduced to a minimum.

The principal feature of these improvements is the new steel and masonry bridge, about a mile long, over the Susquehanna River at Harve de Grace, Md. This bridge was built rapidly and is located about 150 feet north of the old structure at that place. The accompanying illustration shows the new bridge erected with the old bridge to the left. The new bridge contains 44,369 cubic yards of masonry and 20,230,384 pounds of iron and steel and consists of seventeen fixed deck spans as well as a through draw span 280 feet long from center to center of rest piers. The first fixed span on each end is 196 feet 6 inches long and the remaining spans are each 200 feet long on the south half, and 260 feet long on the north half from center to center of piers. The fixed spans have a clearance of 24 feet 3 inches as against 53 feet on the draw span at mean tide.

The draw when opened allows 100 feet on either side for the passage of vessels. The bridge rests upon 20 piers of Alleghany Mountain sandstone with concrete backing and Port Deposit granite coping. They are built at right angles to the bridge, with the exception of the two rest piers for the draw, which are swung 14 degrees to the west to bring them in line with the current of the river. For convenience in reference, the piers are numbered consecutively beginning with the abutment on the east, as number one. The east abutment of Pier No. 1, was built by open cofferdam construction on rock at an elevation of 4.4 feet. Excavation for Piers Nos. 2, 3 and 4 was carried on by the open cofferdam construction, and in the case of Pier No. 3 a depth of -32.0 feet

NEW AND OLD BRIDGES OVER THE SUSQUEHANNA RIVER AT HAVRE DE GRACE, MD.—PENNSYLVANIA RAILROAD.

was reached. From the bottom of the excavations piles were driven to solid rock. Pier No. 2 has 294 piles driven for a foundation to a depth of -77.0 feet. Piers Nos. 3 and 4 each rest upon 390 piles driven until the points reached an average depth of -110.0 and -88.0 feet respectively. The piles were all driven with a No. 2 steam hammer, and followed below the top of the cofferdam by means of extension leads to the pile driver. They were sawed off and capped with concrete for a depth of 2 feet below and 6 feet above the heads. It was impracticable to put a timber grillage on top of the piles, as bracing of the cofferdam made it impossible to get timber of any length to the bottom of the excavations. Piers Nos. 5 to 16 inclusive were built on pneumatic caissons at the following depths:

Pier No.	Extreme Depth of Foundation.
5	-76.8
6	-65.5
7	-87.6
8	-81.2
9	-46.0
East Rest Pier.....10	-48.9
Center Pier 11	-45.5
West Rest Pier 12	-38.3
13	-37.9
14	-32.3
15	-23.6
16	-22.3

The caissons rest upon rock, with the exception of No. 7, which rests upon gravel and No. 8 that rests upon gravel and boulders. It was the intention to build piers Nos. 14, 15 and 16 by the open cofferdam method, but the idea was abandoned in the case of Nos. 14 and 15 because there was so little sand and mud where the piers were located, while in the case of pier No. 16, it was finally given up after a month's work trying to put in a cofferdam and prevent its leaking. Piers Nos. 17, 18, 19 and the west abutment were built on rock in open cofferdams at the following elevations:

Pier No.	Elevation.
17	-17.2
18	-12.3
19	- 1.5
West abutment.....20	- 3.0

Work was started upon the piers in the summer of 1904, but not much river work was done until the ice went out in 1905. The last masonry was laid on the fender pier December 16, 1905.

The fender at the draw is built of piles with a granite pier at the north end and a timber crib filled with stone at the south end. The granite pier rests upon a caisson sunk to a depth of -44.8 feet, while the crib rests on river bottom dredged to a depth of -30.5 feet.

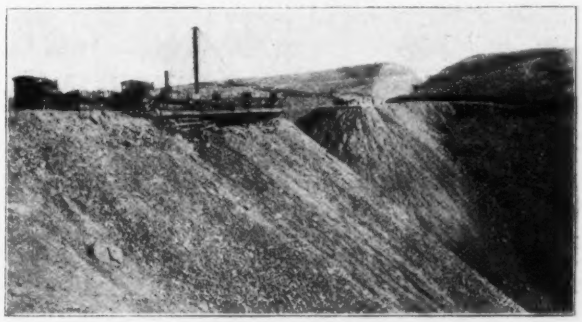
Erection of the steel work was begun August 10, 1905, and finished May 22, 1906. The draw span was erected on false work over the fender and swung into position May 19, 1906.

A Contiuous Unloader for Bank Filling.

WESTERN PACIFIC RY.

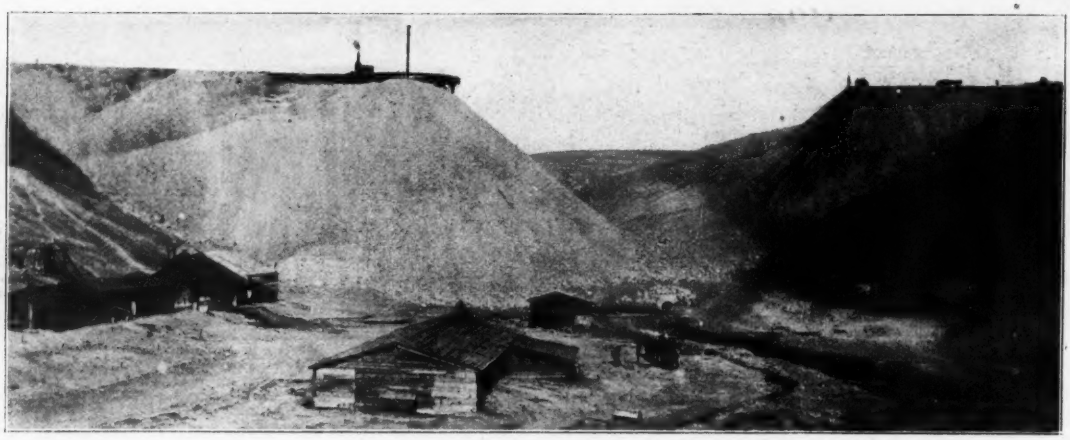
THE railroad contracting firm of E. B. & A. L. Stone Company of Oakland, California, are using a very ingenuous and labor saving device in the moving and placing of materials into deep fills, on construction of the Western Pacific Railway between Oroville and Oakland, Cal., called the continuous unloader, and designed by Mr. F. F. Lloyd, chief engineer.

By referring to accompanying illustrations it will be seen that the unloader is constructed with heavy timber framework supporting a circular track and resembling a

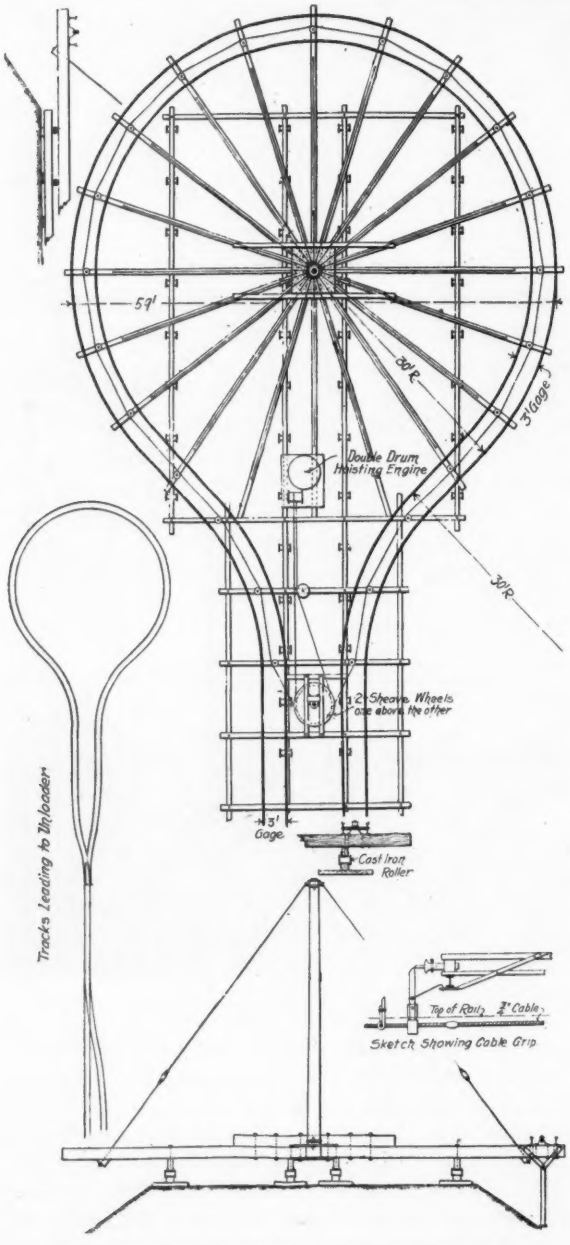


USING CONTINUOUS UNLOADER ON FILL.—WESTERN PACIFIC RY.

merry-go-round in appearance. Between the two tracks leading to and from the circular track, and resting on the deck of the unloader, is a donkey engine which is used to move the cars when placed within reach of a cable from one of the two engine drums. This cable, resting on rollers, leads around the circle between the rails then onto the second drum and is used to draw trains around the



USING CONTINUOUS UNLOADER ON FILL. WESTERN PACIFIC RY.



THE CONTINUOUS UNLOADER — WESTERN PACIFIC RY.

circular track. As the cars are dumped while in motion by a device operated by a dumpman, the only time lost, by reason of the train not being in motion, is that taken in coupling to the locomotive. Except for this necessary delay, the train does not stop from the time it leaves the shovel until it gets back empty. While the train is making the circuit the locomotive shifts from the receiving to the delivering track, in readiness to receive empties. The cars are side dumping and three foot gauge.

In making fills the unloader is carried forward, a few feet at a time, on rollers resting on sills that are laid along the top of the fill as it is made. Material is dumped from the cars at any point on the circular track, and the cars can be run onto the unloader at grade. The base of the machine is kept 4 feet below grade and the width of the fill can be made to reach any width from 30 to 60 feet on grade line.

The simplicity of construction of the unloader and the small amount of timber used when compared with the quantity of timber required in trestles that are ordinarily constructed when fills are to be made are its favorable points. The first unloader was used on a fill 125 feet high and it handled trains faster than a 65-ton steam shovel, side cutting from a borrow pit, could load the trains. In moving it from one piece of work to another none of the machinery was lost or damaged and is readily taken apart and set up. When in operation a crew of six men, including the donkey engineer, is required.

This new device goes far in solving one of the most difficult problems in constructive railroad work in a very satisfactory manner, especially from the financial standpoint and as a time-saver. It also affords a method of handling material on the dump that has proven itself to be one of the fastest now in use.

New Station at Spokane, Washington.

The Northern Pacific, Great Northern and Columbia & Puget Sound Railways have recently built a new union station at Spokane, Washington, to take care of constant increase in traffic. The new station is 330 feet long, 140 feet wide and three stories high, with a tower, covered with a glass tile roofing, 240 feet high. The walls are of vitrified brick with terra-cotta trimmings and the roof is covered with a green tile made from the Ludlow group.

Three Position Upwardly Inclined Signal System.

Pennsylvania Railroad.

THE Pennsylvania Railroad is trying a new system of signals designed largely in accordance with the system proposed at the last annual meeting of the Railway Signal Association on its central division of the Philadelphia, Baltimore & Washington Railroad.

For some years it has been apparent that signalling methods were growing over complex and engineers complained that when running at a speed of seventy miles an hour it was difficult to read with absolute accuracy the indications displayed on a post, oftentimes containing as many as five semaphore arms. It was the purpose of the designers of this system to reduce it to the simplest terms and remove every possible opportunity for mistake.

The installation is on the Central division, running southwest from Philadelphia. On Forty-ninth street (see Fig. 5) is a reporting station, being at the terminal of the Central and Philadelphia Terminal divisions, and train orders are frequently necessary. Signals Nos. 32C and 33C are ordinarily operated as automatic signals, but may be placed in stop position by the operator when necessary. The lights are therefore vertical instead of staggered and the signals are "Stop and Stay," instead of "Stop and Proceed."

Fernwood is a junction point with a branch line. It was thought that the business hardly warranted the employment of operators and installation of an interlocking immediately, but an advance signal eastbound was required for trains leaving the branch, and was located in its proper position for use if an interlocking were installed later. It was also desired to demonstrate the ease of control of a distant signal by two home signals. Under such circumstances, signal No. 62 at Lansdowne can only be cleared when signal No. 56 is cleared and No. 54 is at caution or clear. The wireless circuit is used.

Under ordinary circumstances the pole changer on a given signal reverses as soon as the signal moving from stop reaches the caution position, thus clearing the signal in the rear which has assumed the caution position on the passage of the train from its block. A pole changer of this kind is placed on advance signal No. 54, but as signal No. 62 at Lansdowne must be cleared only when advance No. 54 is at proceed and consequently when home signal No. 56 is clear, the pole changer on this home signal does not shift until the arm attains the clear position, and no wires such as are commonly used for distant control by two home signals are needed.

Between Clifton and Swathmore the right of way was so limited that the telegraph line interfered seriously with the view of the signals and two track signal bridges were used. The hand rails were not entirely completed when photographs were taken. Fig. 1 shows a stop and stay signal mounted high so it can be easily read. The second signal shows vertical and the lights are directly under one another. By comparison with figure 2 it will be noticed that second signal light is offset to the left. The visible difference between "stop and stay" and "stop and proceed" signals will be apparent. At night this difference is very marked, for the signals are about six feet apart vertically and the lower light is located two feet to the left.

Fig. 2 shows the bridge between Morton and Swathmore. The automatic signal on the right also gives the distant indication for Morton interlocking and the one on the left the distant indication for the next automatic at Swarthmore.

FIG. 1. STOP AND STAY, SIGNAL ON POST.—PENNSYLVANIA RAILROAD.

Fig. 3 shows a special support for signal No. 141 at Media. This signal has three functions. First, it shows the condition of the track (block) between Media and Elwyn interlocking, hence, the upper only is active. Second, it is a train order signal for Media office, where the division headquarters are located, hence, the lights are vertical, it being a "Stop and Stay" signal, and third, it is a distant signal for the interlocking home signal at Elwyn, consequently, the normal position is caution. It assumes the stop position only when circuit is opened by the Media operator when he has orders, or when the track is occupied and the clear position only when there are no orders. When the track is clear through Elwyn interlocking and the Elwyn home signal which is the end of the automatics, and consequently a two-position (horizontal and clear) signal, is at clear.

The treatment of signal No. 156 is one of the debatable points. This being the commencement of the block system and track circuit controlled, three courses were open. The lower arm is the distant for the signal shown

in Fig. 1, and is consequently two-position. If treated as an automatic block signal, the top arm with tracks occupied would also show stop, and a stop signal would be displayed with no warning distant signal in the rear, which violated the principle of advance information for every stop signal.

If treated as is the custom at the beginning of an automatic installation on the Pennsylvania Railroad, namely, as a distant signal simply, and not indicating the condition of the track, it obviously should not have the lower arm at stop and the top arm at caution, normally, as this is the aspect of the other signals when next signal is at stop and track clear. Hence, the top arm was fixed at caution and the lower arm moves only from caution to clear. This can only be cleared when track is unoccupied, so that this latter aspect does not conflict with the other signals, and in the normal indication two arms, at forty-five degrees, is a different aspect from any other displayed.

It is still an open question whether or not this should be made a "Stop and Proceed" signal, the arguments in favor being that then the caution position would always mean track clear and next signal at stop on every signal, and the stop indication would never be displayed unless track were occupied when a stop is required. The argument against is the lack of distant signal, in turn, for it. This point and one other are practically all that are to be decided to complete and perfect the system.

A second point has developed in working out the details of the signalling at the new Washington Terminal, where the same system is to be installed jointly by the Baltimore and Ohio, and the Pennsylvania Railroad Companies.

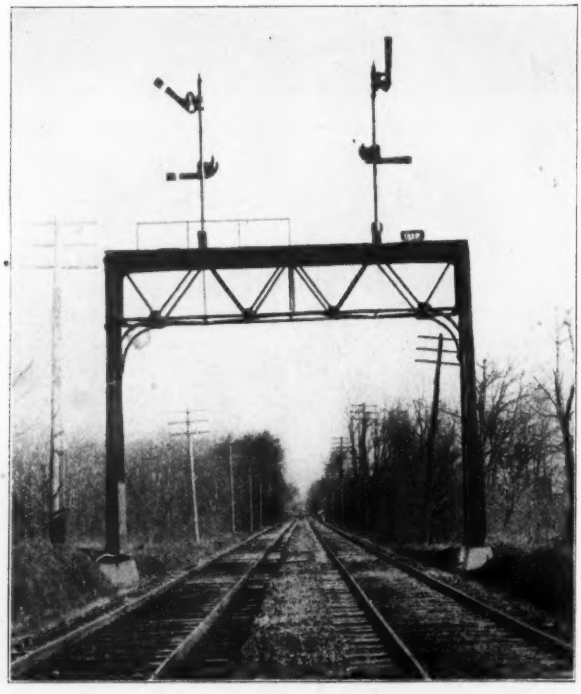


FIG. 2. STOP, WAIT TIME AND PROCEED SIGNAL ON BRIDGE.— PENNSYLVANIA RAILROAD.

With all interlocking signals semi-automatic, as on the Central division, it is impossible to attach cars or switch engines to trains, or to close trains in, except under hand signals. The same difficulty exists on all roads in automatic limits, when the interlocking home signals are semi-automatic. It is now proposed to make the low speed arm semi-automatic, from caution to clear only, and to so arrange the locking and circuits that it may be displayed at caution for any route, including the high speed routes, if the latter are blocked by cars within the interlocking limits.

In other words, if a high speed route is clear and next signal clear, the top arm will clear. If the track is clear and the next signal at stop, it will assume the caution position. If the track is occupied the top arm will indicate stop, but the low speed arm may be shown at caution, thus combining the safety of the semi-automatic feature for high speed movements, and the elasticity now attained where at outlying interlockings, the signals are not semi-automatic, and hand signals are the exception rather than the rule.

The decimal system of numbering is used. Each signal is numbered in tenths of miles from Broad Street Station, Philadelphia, odd numbers for westbound signals, corresponding with the odd numbered trains, and even numbers for eastbound, the nearest tenth being taken. By this system, signals can be added without inserting half numbers, etc., and the location is quickly determined by dispatchers when one is reported out of order. The affix "C" on the signals at Forty-ninth Street indicated "Central division," as they are located on the Terminal division, where the main line signals have the numbers only, those for the New York division having "N," Schuylkill division "S," and Maryland division "M," added to the number.

The interlocking plants of this installation are mechanical, and all signals are electro-pneumatic. Compressed air at 90 pounds per square inch and electricity at 500 volts are furnished from a centrally located plant. The air is transmitted through a 2½-inch main and the electricity by a No. 6 B. & S. G. copper wire. Power for operating the track circuits and signals is taken from storage batteries located at various places. The batteries are charged in series from the 500 volt supply, eight hours at a time, four nights a week. The batteries are type 5 E Chloride accumulators, each signal pole being supplied with two cells. One cell is used to operate the sixteen-ohm signal cylinder magnets and also to feed the track circuit in the rear through a one-ohm resistance in connection with the rails. The other cell is in circuit ready for charging. The system of circuits is known as the polarized wireless, the only wires used being those for the charging line, approach indicators, locks for interlockings and indication locks of the signals.

The high signals are iron, inside connected, and provided at their bases with a suitable box for holding the storage batteries, cut-out switches, etc.

The signal cylinders are tandem and the arms are pulled "Clear" by a three-sixteenths-inch rod instead of being pushed "Clear" by a three-quarter-inch pipe of a

one-inch rod. This new construction saves considerable power. The relays are five-ohm universal, neutral polar and the pole changers are pneumatic. It has developed that an ordinary mechanical pole charger would probably be as well suited to the work.

All switches are equipped with rotary circuit controllers which shunt the track through two No. 6 B. & S. wires when switches are open. All boot-leg wires are No. 6 B. & S. plugged through web of rail with channel pins and running direct to battery, relay or pole changer without splices.

All sidings are equipped with pipe connected derails, operated from the main track switch lever. Both ends of the main line cross-overs are operated through switch and lock movements from one ground lever placed in the middle of the cross-over tracks, making it impossible for careless trainmen to close the switches and clear the signals with a light engine standing on the cross-over, and avoiding the use of special circuits to protect this danger point.

At first trainmen unfamiliar with the device used too much force on this lever, and connections were sprung, or switch timbers moved. This trouble has practically ended, but it is thought that in future installations it will be preferable to use this lever to lock the points only for main track, operating them from ordinary switch stands, and thus making flying switches possible while insuring that switches must both be locked before the signals will clear, the circuit closer being operated by the lock itself instead of by the switch.

All interlocking home signals are power operated, semi-automatic controlled through stick indicators so arranged that they go to stop on the passage of train, and cannot be operated again until the train has left the circuit, and the operator restored his lever normal and again reversed it. Approach indicators and approach locking are provided, taking effect one block in the rear of the distant, and so arranged that if the home lever latch has been raised it cannot be put down to release the machine locking until a period of two minutes has elapsed. The circuits are so arranged that if a portion of the train is left on the approach circuit, the locking automatically releases when engine enters the home signal circuit, so that no hand or time release is required for ordinary trailing drill movements, but if a second train enters the section, the approach locking will become effective as soon as the home signal is cleared for it to proceed. The circuits are simple and ingenious and have been employed at many points in the system with great success.

The slow hand release, so called, is really a time release, operated pneumatically and so arranged that it is out of control of the operator. This is another ingenious device and its first application was made at Morton. Special lamps and brackets were provided, as it is known that with those in ordinary use the lost motion between the lamp socket and bracket were sufficient to allow the lens in many cases to angle so much to the side as to prevent its focusing properly along the track.

The principles that govern the new installation are:

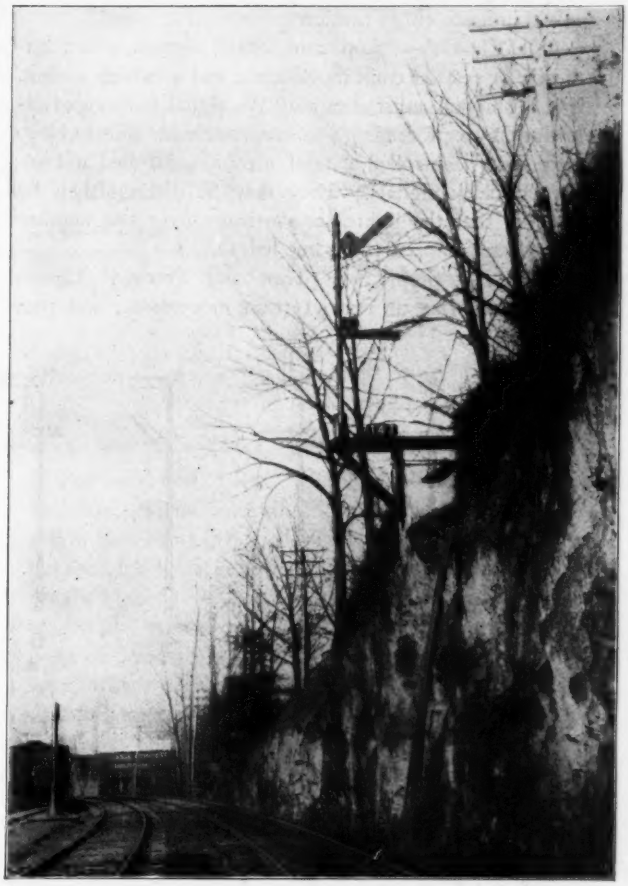


FIG. 3. SPECIAL SUPPORT FOR SIGNAL.—PENNSYLVANIA RAILROAD.

(1) Two arms and two lights will be displayed on every high signal. With existing signal arrangements the number of arms and lights is variable and depends upon track conditions so that there may be from one to five on a post. If any arm were broken or a light extinguished an engineer would probably not notice it, as he could not be expected to remember how many there were on each particular post, while if there were always two he would notice the slightest derangement of either of them. A small arm with a lower power light will, at times, be placed further down on the post or on a separate low post, but it will be so far away from the two main signals and of so much smaller size and less powerful light, that it will in no way interfere with the two arm and light principle.

(2) Day indications are given by three positions of the arm in the upper right hand quadrant, and at night each position is indicated by a different colored light. When the arm is horizontal a red light is displayed, when it is raised to an angle of forty-five degrees a green light is displayed, and when it is still further raised to a vertical position a white light is displayed. Raising the arm above the horizontal has a distinct advantage over the usual practice of lowering it below the horizontal to an almost vertical position. Accumulations of ice, sleet, etc., on the arm tend to move it downward; with the new arrangement this would indicate caution or stop,

while with the old arrangement the downward movement would indicate either caution or proceed at speed.

(3) Class A—"Stop and Stay" signals which authorize or restrict train movements, and at which a train, if it is stopped, must stay until the signal is changed allowing it to proceed. This class includes interlocking, train order, controlled manual, manual controlled and telegraph block signals. They may be distinguished by the fact that the lights are vertically over one another and the arms appear the same length.

Class B—"Stop, Wait Time and Proceed" signals which authorize or restrict train movements, and past

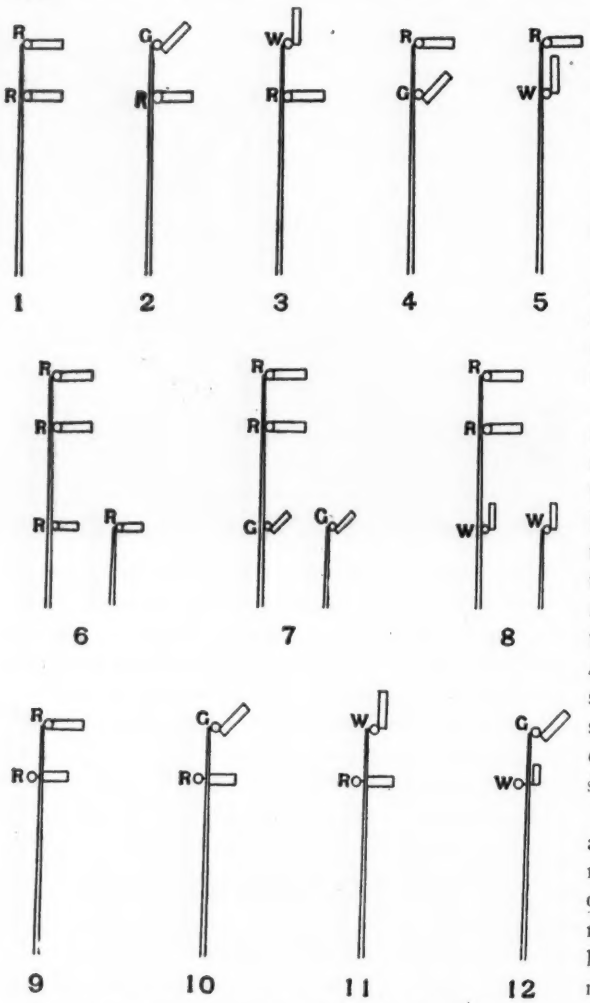


FIG. 4. SIGNAL INDICATIONS.—PENNSYLVANIA RAILROAD.

which a train, if it is stopped, may proceed after waiting time, even though the signal has not changed and still indicates stop.

This class includes automatic signals (and incidentally distant signals when the latter are used as independent indications). They may be distinguished by the fact that the lower arm and light are not distinctly under the upper arm and light, but located toward the left, so that the lower arm appears about two feet shorter than the upper one and the lower light shows on the left hand side of the post, while the upper one shows on the right hand side. This staggered relation of the two signals is very noticeable both in daytime and at night.

Class C—Signals which give information only and do not authorize or restrict train movements: Switch indicators, both home and distant; flag station, water tank and stop and slow signals, indicated by horizontal lights and special designs for day indicators. These signals are all low and do not interfere with the two signal principle used on the high poles.

(4) Signals designate the speed of the trains rather than the routes, at points where interlocking systems are used.

The top arm governs the high speed track, provided no crossover movement is included in the route. It indicates proceed at highest speed permissible, modified, of course, by curves or any arbitrary order placed upon the speed.

The second arm governs medium speed movements, and refers to a divergence from the high-speed routes, such as an easy crossover upon which a speed of forty or fifty miles an hour is proper.

The third arm governs low speed movements; over short crossovers, against traffic, into sidings, etc. This arm is shorter than the other two, has a short range light and is placed much lower down the post than the two main signals.

The classification of signal indications used is represented in Fig. 4. The letters R, G and W indicate color of lights red, green and white respectively. Numbers 1 to 8 inclusive, are class "A," "Stop and Stay" for interlocking and train orders. The first five govern the movement of high and moderate speed trains while the latter three refer to low speed trains. No. 1—Stop and Stay; 2—Proceed with caution to next signal, on high speed track. 3—Proceed at high speed, on high speed track; 4—Proceed with caution to next signal, on moderate speed track; 5—Proceed at moderate speed on moderate speed track; 6—Stop and Stay; 7—Proceed with caution on low speed track; 8—Proceed at low speed on low speed track.

Numbers 9 to 12 inclusive, are class "B," stop, wait time and proceed, for automatic system, also for distant signals when the latter are used as independent indications; 9—Stop and proceed after waiting time; 10—Proceed to next signal prepared to stop; 11—Proceed at speed, next high speed signal at caution or clear; 12—Proceed at moderate speed to next moderate speed signal at caution or clear.

The installation has been in service about two months and its operation has been highly satisfactory. During the rush hours in the morning there are ten trains east in two hours and eight minutes, or a train every thirteen minutes, while two freights are working their way west with work to do on the eastbound track at various stations. In the evening, when the commuter travel is westbound, there are nine trains in less than two hours, or a train every thirteen minutes, with generally one freight west and two east with work to do. Under these conditions the operation of signals is very frequent and the requirements for their proper operation to prevent delay

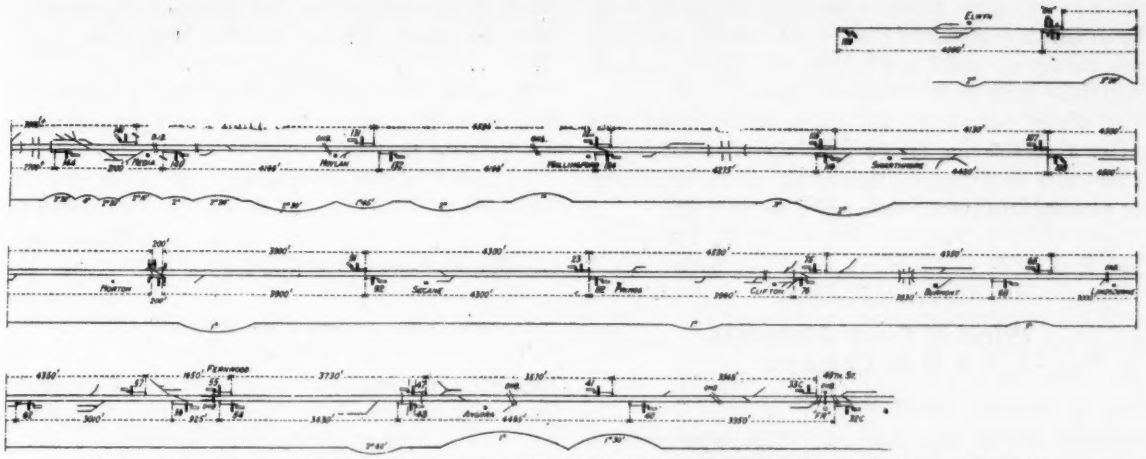


FIG. 5. ALIGNMENT AND POSITION BLOCK SIGNALS BETWEEN ELWYN AND PHILADELPHIA,—PENNSYLVANIA RAILROAD.

and insure safety are very exacting. There are 40 signals in service, equal to 80 home and distant. During December there were three failures in operation—one due to broken wire, one due to weak battery and one cause unknown. The percentage of failures on the home and distant basis is, therefore, .038 per cent.

It is probable that if the system goes into general use the colors of lights will be changed as recommended by the Railway Signal Association.

The indication "Clear" will be given by green instead of white, and the indication "Caution" will be given by yellow instead of green. This change will do away with the use of a white light and is an important improvement for the breakage of a red or green lens can now be made to give the indication "Clear," while if the new arrangement of colors is adopted a broken lens gives a white light, which does not signify anything except that the signal is improperly displayed.

Communication.

Painting Steel Bridges in Winter.

Editor Railway Engineering:

In commenting upon editorial in your March issue I wish to say the question of durability regarding the painting of steel bridges, is not so much a question of season as it is a question of favorable weather. So far as temperature is concerned, either extreme (hot or cold) is equally detrimental to paint. Extreme heat forces paint to dry rapidly and therefore unnaturally, while extreme cold retards the drying, and consequently also causes unnatural drying. Oil paints waste much in weight and body under extreme heat, while the reserve is true in cold weather. The latter is an advantage, but is offset in many instances by the injury sustained whenever the paint becomes frosted before it is dry. When an oil paint dries naturally it absorbs the requisite amount of oxygen but if forced by extreme heat or by the addition of artificial dryers, its durability is correspondingly impaired. A temperature of from fifty to sixty degrees, provided the atmosphere is not overladen with moisture, is far more conducive to durability than either extreme heat or cold. Water which is usually to be found in considerable quantity near or underneath most steel bridges, is a factor to be reckoned with, in bridge painting. The ascending moisture caused by the evaporation of the water is very detrimental, especially while painting, unless there is sufficient heat to dissipate it before it envelops the steel structure. On this account much care is necessary in order to guard against painting over and sealing up in the pores of the iron, such moisture that may have been absorbed by the metal. Moisture thus absorbed will remain indefinitely, or until there has been a protracted season of dry weather of sufficient duration to dry it out. Whether the painting is done on naked metal or over old absorbent paint, it is necessary as a preliminary step to determine the presence or absence of moisture before painting. That portion of a bridge most exposed to the rays of the sun presents the greater advantage for painting in winter on account of the action of the sun, or more correctly speaking, by the position of such structures to the sun at various seasons. As for instance, painting the sunny side of a bridge in winter when conditions require it, and those parts never reached by the sun in warmer or dryer weather. Another feature of bridge painting whether in winter or summer, that does not always receive the attention it should, is the method of cleaning and application of paint. When it becomes necessary to scrape away or sandblast the structure, thus exposing the bare surface of the metal, the cleaned surface should in no instance be left unprotected over night, or for a period sufficiently long to absorb moisture, but should be followed up immediately with the painting. Sand blasting a bridge or other structure previous to painting, has the advantage of being dried or freed of moisture at the same time to a large extent by the compressed air that operates the sandblast, that is provided the atmosphere is not overcharged with moisture, as the air taken in by the compressor is necessarily of the same humidity as that of the surrounding air. This is a common mistake in the construction of air compressors, as the air inlet should be

placed in the engine room, or arrangements made to dry the air before it enters the compressor. Where this is the case, the dry air could be utilized to dry out the moisture from those parts of the bridge not exposed to the sun.

All things considered, the winter season is not altogether favorable for bridge painting. The fall season is far more advantageous than either winter or summer for painting structures whether of wood or metal.

J. H. PITARD
M. & O. R. R. Whistler, Ala.

Prices of Track Materials.
F. O. B. Chicago.

TRACK SUPPLIES.

Steel Rail, 60 lbs. and over	$28.00 per gross ton
Steel Rail, 30 to 45 lbs.	35.00 per gross ton
Steel Rail, 25 lbs.	36.00 per gross ton
Steel Rail, 20 lbs.	37.00 per gross ton
Steel Rail, 16 lbs.	38.00 per gross ton
Steel Rail, 12 lbs,	39.00 per gross ton
Ties, 6x8x8 oak, 1st grade	75c. each
Ties, 6x8x8 oak, 2d grade	60c. each
Switch Ties	$30.00 to $35.00 M. ft.

Angle bars, accompanying rail orders, 1907 delivery, 1.65c.; car lots, 1.90c. to 1.95c.; spikes, 2.35 to 2.45c., according to delivery; track bolts, 2.65c. to 2.75c., base, square nuts, and 2.80c. to 2.90c., base, hexagon nuts. The store prices on track supplies range from 0.15c. to 0.20c. above mill prices. Switch set per turn out, $175 to $200.

OLD MATERIAL.

	Per Gr. Ton.
Old Steel Rails, 3 ft. and over	$18.50 to $19.00
Old Steel Rails, less than 3 ft	18.00 to 18.50
Old Steel Rails	25.00 to 26.00

SHEET STEEL.

It is quoted for future delivery:

Tank Plate, ¼-in. and heavier, wider than 6¼ and up to 100 in. wide, inclusive, car lots, Chicago, 1.86½c. to 2.06½c.; 3-16 in., 1.96½c. to 2.16½c.; Nos. 7 and 8 gauge, 2.01½c. to 2.21½c.; No. 9, 2.11½c. to 2.31½c. Flange quality, in widths up to 100 in., 1.96½c. to 2.06½c., base, for ¼-in. and heavier, with the same advance for lighter weights: Sketch Plates, Tank quality, 1.96c. to 2.16½c.; Flange quality, 2.06½c. Store prices on Plates are as follows: Tank Plate, ¼-in. and heavier, up to 72 in. wide, 2.20c. to 2.30c.; from 72 to 96 in. wide, 2.30c. to 2.40c.; 3-16 in. up to 60 in. wide, 2.30c. to 2.40c.; 72 in. wide, 2.55c. to 2.65c.; No. 8 up to 60 in. wide, 2.35c. to 2.45c.; Flange and Head quality, 0.25c. extra.

STRUCTURAL STEEL SHAPES.

Store quotations are unchanged at 2.05c. to 2.10c., and mill prices are as follows: Beams and Channels, 3 to 15-in., inclusive, $1.86½c.; Angles, 3 to 6-in., ¼-in. and heavier, 1.86½c.; larger than 6-in. on one or both legs, 1.96½c.; Beams, larger than 15-in., 1.96½c.; Zees, 3-in. and over, 1.86½c.; Tees, 3-in. and over, 1.91½c., in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

CAST IRON PIPE.

Quotations per net ton on Water Pipe, 4 to 6-in., $35; 8 to 12-in., $33; over 12-in., average, $31; with $1 per ton extra for gas pipe.

CEMENT.

	Package.
Good grade Portland Cement, car lots	$1.95 in wood 1.55 in paper *1.95 in duck

*(Duck sacks credited when returned.)

SAND.

Bank sand, car lot	$ .75 per yd.
Torpedo sand, car lot	1.20 per yd.

CRUSHED STONE AND GRAVEL.

Crushed limestone, car lot	$1.10 per yd.
Crushed gravel, car lot	1.00 per yd.

Personals.

Mr. W. R. Hudson has been appointed superintendent of terminals of the Southern Railway at Salisbury, N. C., and Mr. J. H. Witt has been appointed superintendent at Richmond, Va., to succeed Mr. Hudson transferred.

Mr. K. S. Hull has been appointed superintendent of the Gulf, Colorado & Santa Fe at Temple, Tex., to succeed Mr. T. B. Coppage, resigned.

Mr. C. M. Scott has been appointed superintendent of the Maricopa & Phoenix and Salt River Valley R. R., with office at Phoenix, Ariz., to succeed Mr. M. O. Bicknell, transferred.

Mr. F. T. Slack has been appointed superintendent of the New York Central & Hudson River R. R., in charge of the Hudson and Putnam divisions, with office in the Grand Central station, New York. Mr. Slack has heretofore been assistant superintendent of the Hudson division.

Mr. George Hannauer has been appointed superintendent of the Chicago, Indiana & Southern and the Indiana Harbor Railroads, with office at Danville, Ill.

Mr. R. L. Barrett, has been appointed superintendent of the Alabama Great Southern at Birmingham, Ala.

Mr. W. A. Gore, heretofore chief train dispatcher on the Seaboard Air Line, has been appointed superintendent of the third division, with office at Abbeville, S. C., in place of Mr. J. H. Witt, transferred.

Mr. L. W. Miller has been appointed general track inspector of the Mexican Central at the City of Mexico.

Mr. H. T. Buckwald has been appointed roadmaster of the Wabash Pittsburg Terminal and the West Side Belt Railroads at Pittsburg, Pa.

Mr. W. B. McLaughlin has been appointed engineer of maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis at Mattoon, Ill., to succeed Mr. L. S. Rose.

Mr. J. G. Gwyn, heretofore assistant chief engineer of the Denver & Rio Grande and the Rio Grande Western, has been appointed chief engineer, with headquarters at Denver, Colo., succeeding Mr. E. J. Yard, deceased.

Mr. J. H. Johnston has been appointed division engineer of the Illinois Central's new line between Corinth, Miss., and Haleyville, Ala., with headquarters at Corinth. He will have charge of track-laying, ballasting, surfacing and building construction, as well as of trains and equipment engaged in construction, and Mr. W. F. Gordon, Jr., will continue in charge of grading and bridge construction work.

Mr. Jerome Newman has been appointed construction engineer of the North Coast, with office at Spokane, Wash.

Mr. J. F. Porterfield, heretofore division superintendent of the Yazoo & Mississippi Valley, has been appointed superintendent of the Louisiana division of the Illinois Central at McComb, Miss., in place of Mr. F. S. James, resigned. Mr. F. A. C. Ferguson has been appointed to succeed Mr. Porterfield as superintendent of the New Orleans division of that road at Vicksburg, Miss.

Mr. K. J. C. Zinck has resigned as engineer of maintenance of way and construction of the Algoma Central & Hudson Bay.

Mr. James R. Ledwell has been appointed general roadmaster of the Albany & Hudson at Albany, N. Y., succeeding the late Charles R. Eastman.

Mr. G. A. Mitchell has resigned as master of bridges and buildings of the Grand Trunk at Toronto, Ont., to accept a position with the Great Northern.

Mr. L. F. Champion, resident engineer of the Southern Pacific at Tucson, Ariz., has been transferred to Oakland, Cal., in a similar capacity, succeeding Mr. R. M. Drake, promoted.

Mr. B. F. Beckman, heretofore engineer of maintenance of way of the St. Louis El Reno & Western, has been appointed superintendent of that road and the Ft. Smith & Western, with headquarters at Ft. Smith, Ark., and the former position has been abolished.

Mr. F. S. Forest, heretofore assistant general superintendent of the Great Northern at Minot, N. D., has been appointed general superintendent of the Spokane Falls & Northern, the Columbia & Red Mountain, the Red Mountain, the Nelson & Fort Sheppard and the Washington & Great Northern railroads, and the Vancouver Victoria & Eastern Railway & Navigation Company of the Great Northern system, with headquarters at Spokane, Wash.

Mr. James D. Welsh, superintendent of the southern division of the Colorado & Southern, has been appointed general superintendent, with headquarters at Denver, Colo. He succeeds Mr. Joseph H. Young, who resigned to go with the St. Louis & San Francisco as general manager.

Mr. William Bennett has been appointed acting roadmaster of the Missouri & North Arkansas at Harrison, Ark.

Mr. E. L. Cousins has been appointed division engineer of the Grand Trunk at Toronto, Ont., in place of Mr. G. R. McLeod, resigned.

Mr. R. C. Thurston has been appointed supervisor of electric service of the Erie, with headquarters at Avon, N. Y., effective on March 26.

Mr. Leon F. Lonnbladh, assistant superintendent of construction of the Southern Railway, and formerly chief engineer of the Tennessee Central, has been appointed chief engineer of the Colorado Southern New Orleans & Pacific, with headquarters at Beaumont, Tex.

Mr. C. C. Boyer has been appointed resident engineer of the Gulf, Colorado & Santa Fe at Temple, Tex., in place of Mr. M. T. Pratt, resigned.

Mr. P. C. Connelly, division roadmaster of the Great Northern at Superior, Wis., has been appointed general roadmaster of the eastern district at St. Paul, Minn. Mr. A. Brown has been appointed general roadmaster at the central district at Minot, N. D. Mr. C. Whitfield, division roadmaster at Whitefish, Mont., has been appointed general roadmaster of the western district at Spokane, Wash. Mr. J. J. Hess has been appointed division roadmaster at Superior, Wis., in place of Mr. Connelly.

Mr. J. W. Stewart having resigned as chief engineer of construction of the Norfolk & Southern to accept service elsewhere, the duties of the office have been assumed by Mr. Charles O. Haines, vice-president, Raleigh, N. C. All reports heretofore made to the chief engineer in the future will be made to Mr. Thomas W. Cothran, principal assistant engineer, Raleigh. Mr. William P. Marshall is division engineer at Wilson, N. C., and Mr. C. C. Fitzgerald is division engineer at Washington, N. C.

Mr. Ralph Goodman has been appointed supervisor of the Pennsylvania Railroad at Lancaster, Pa., in place of Mr. J. C. Gucker, transferred. Mr. M. W. Clement has been appointed assistant supervisor of division No. 2, to succeed Mr. C. E. Brinser, promoted. Mr. W. S. Springer has been appointed supervisor at Cresson, Pa., in place of Mr. C. E. Zortman, transferred.

Mr. R. W. Hebard, heretofore assistant engineer of the Isthmian Canal Commission, has been appointed resident engineer, with office at San Pablo.

Mr. George H. Brown, assistant engineer of the Pennsylvania Railroad at Atloona, Pa., has been appointed assistant engineer of the Philadelphia division at Harrisburg, Pa., to succeed Mr. A. B. Cuthbert, promoted. Mr. R. V. Massey has been appointed assistant engineer of the Schuylkill division at Reading, Pa., in place of Mr. R. L. Roe, transferred. Mr. N. W. Smith has been appointed assistant engineer of the middle division at Altoona, Pa., in place of Mr. George H. Brown.

Mr. George W. Snyder has been made principal assistant engineer of the Western Pennsylvania division of the Pennsylvania Railroad, with headquarters at Pittsburg, Pa. Mr. Allen B. Cuthbert has been appointed principal assistant engineer of the Eastern Pennsylvania division in place of Mr. A. J. Whitney, Jr., promoted. Mr. Elisha Lee has been appointed principal assistant engineer of the Philadelphia, Baltimore & Washington Railroad in place of Mr. Charles S. Kirck, promoted. Mr. W. T. Covert has been appointed assistant engineer of the Chautauqua division of the Pennsylvania Railroad to succeed Mr. W. S. Thompson, transferred.

Mr. L. S. Oakes, formerly resident engineer of the Northern Pacific at Duluth, Minn., and recently in charge of construcion in Washington, has been appointed division engineer at Spokane, Wash., in charge of engineering matters on lines between Ellensburg and Trout Creek, succeeding Mr. T. H. Croswell, transferred. The jurisdiction of Mr. F. J. Taylor, division engineer at Livingston, Mont., has been extended west to Trout Creek. Mr. W. C. Taylor, heretofore acting division engineer at St. Paul, Minn., has been appointed division engineer at that point, in charge of engineering matters between Mandan and Staples. Mr. L. M. Perkins has been appointed division engineer at St. Paul, in charge of engineering matters on lines east of Staples.

The following appointments are announced on the St. Louis & San Francisco railroad. Mr. J. H. Young has been appointed general superintendent of the first district, with headquarters at Springfield, Mo., succeeding Mr. A. O'Hara, who has been transferred to the superintendency of the eastern division, with office at Springfield, Mo., in place of Mr. H. H. Brown. Mr. A. J. Sams, heretofore superintendent of the southeastern division, is appointed superintendent of the western division, with office at Enid, Okla. Mr. T. B. Coppage, division superintendent of the Gulf, Colorado & Santa Fe at Temple, Tex., is appointed superintendent of the southeastern division of the St. Louis & San Francisco, with headquarters at Birmingham, Ala., succeeding Mr. A. J. Sams. Mr. H. F. Clark, heretofore superintendent of the western division at Neodesha, Kan., is appointed superintendent of the Kansas division, with headquarters at the same point. Mr. H. H. Brown, heretofore superintendent of the eastern division, is appointed superintendent of the Ozark division, with office at Memphis, Tenn., in place of Mr. A. D. Lightner. Mr. J. W. Walton, who recently resigned as superintendent of the Missouri, Kansas & Texas at Parsons, Kan., is appointed superintendent of the Red River division of the St. Louis & San Francisco, with headquarters at Francis, I. T.

Mr. S. C. Long, heretofore superintendent of the Pittsburg division of the Pennsylvania Railroad, has been appointed general superintendent of the new Grand Western Pennsylvania division. Mr. R. T. Morrow, heretofore superintendent of the Western Pennsylvania division, has been appointed superintendent of the Pittsburg division, with headquarters at Pittsburg, Pa. Mr. Andrew Keiser, assistant superintendent of Pittsburg division, has been appointed superintendent of the Western Pennsylvania division, with office at Pittsburg, in place of Mr. Morrow. Mr. Daniel C. Stewart, superintendent of telegraph, has been appointed assistant superintendent of the Pittsburg division at Youngwood, Pa., in place of Mr. Keiser. Mr. John B. Fisher succeeds Mr. Stewart as superintendent of telegraph, with office at Philadelphia, Pa. Mr. W. G. Coughlin, heretofore division superintendent at Elmira, N. Y., has been appointed superintendent of the Middle and Western divisions of the Philadelphia & Erie Railroad division, with headquarters at Renovo, Pa., succeeding the late Thomas Roberts. Mr. James Buckelew has been appointed superintendent of the Allegheny division, with headquarters in Pittsburg, in place of Mr. Charles T. Dabney, who has been transferred to the superintendency of the central division at Media, Pa., to succeed Mr. Buckelew. Mr. Herbert A. Jaggard, general agent at Pittsburg, has been appointed superintendent of the Elmira division, with office at Elmira, N. Y., succeeding Mr. Coughlin, and the former position has been abolished. Mr. A. J. Whitney, Jr., heretofore principal assistant engineer, has been appointed superintendent of the Delaware division to succeed R. L. Holliday, deceased. Mr. Charles S. Krick, heretofore principal assistant engineer of the Philadelphia, Baltimore & Washington, has been appointed superintendent of the Pennsylvania, New York & Long Island.

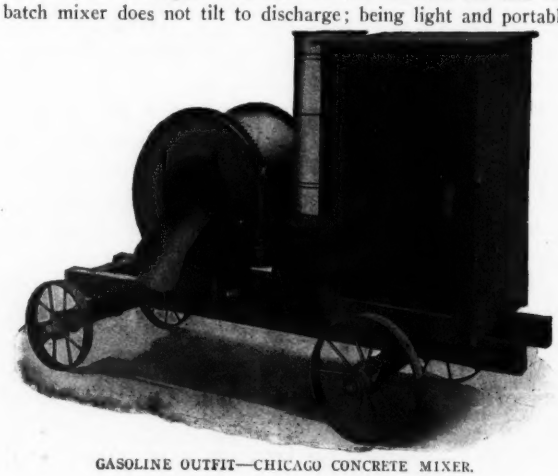
Chicago Concrete Mixer.

It will be of interest to know that the increased demand for the Chicago Concrete Mixer has necessitated the Chicago Concrete Machinery Company, which as been located at 22-24 W. Randolph street, to move into larger quarters. After May 1st this company will be located at 20 South Canal street. The manufacturers claim the Chicago Concrete Mixer has all the

STEAM OUTFIT—CHICAGO CONCRETE MIXER.

good qualities of the various other mixers in use and is meeting with success on account of its simplicity and durability in construction. It is well designed and sold at a moderate price.

Some of the superior features of this machine are that the batch mixer does not tilt to discharge; being light and portable



GASOLINE OUTFIT—CHICAGO CONCRETE MIXER.

it can be set up and put in operation in a few minutes; the wearing parts are protected on the discharge side by a steel apron; the outer form of the drum is cylindrical, with deflecting blades riveted across the corners that give the inner drum a cubical formation. In the process of mixing, the material in the receiver is given a strong alternating sidewise movement by the action of the blades in addition to that caused by the revolving of the drum. Probably the most important feature of this machine is the convenience of discharging a part or the whole of the mix as desired, with comparative ease. The machine being close to the ground, is convenient to load, and keeps on working, whether the men are loading or discharging. Much needless shoveling is avoided, from the fact that the mixed material goes directly into wheelbarrows or carts, whereas most other mixers dump the batch on the ground.

This machine can be had in various sizes and capacities, details of which will be furnished on request, including prices. It is mounted on a truck, or skid, with gasoline, steam or motor drive, and where gasoline is used the engine is housed. Mr. W. J. Rosebery, Jr., recently elected secretary and treasurer of the company, is well known in this field, as a practical concrete machinery man.

An Improved Track Drill.

The difficulties heretofore encountered in drilling rails in position by track-layers have been somewhat improved by recent changes made on track drills.

The Cook Standard track drill, illustrated herewith, has had several improvements that may be of interest to master mechanics and engineers of maintenance of way.

The ball bearings of this tool, as it is now made, are encased

DETAILS OF COOK TRACK DRILL.

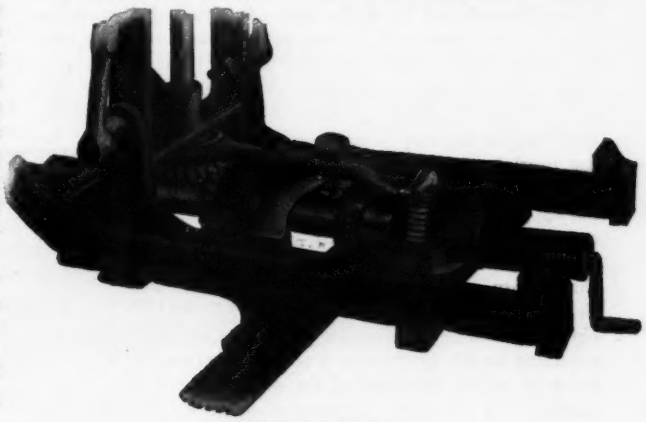
in highly tempered tool steel "racers" of improved construction. They are self contained in such a way that the balls cannot be lost out of the racers, or when the bearings are put on or taken off, this latter being accomplished by merely unscrewing a set screw.

This method of absorbing the thrust eliminates the cutting of the thrust bearing, which is a common drill trouble, the friction at the thrust point greatly lessened as the power exerted on the handles of the drill can be used at the bit point in cutting through the rail, and not lost in the drill mechanism.

As a further means of absorbing the bit thrust and reducing friction to a minimum, a square nut, internally threaded to fit the feed screw is adapted to take the thrust. The ratchet wheel (heretofore held as if in a vise) being thus relieved of carrying the thrust, revolves easily and prolongs the life of the pawls, cam, the forks at the end of the "walking beam" or arm, the gears and all other wearing parts.

Another feature of the Cook Standard track drill in its improved form is the "quick return" of the drill bit. This is accomplished by means of a crank at the end of the feeding screw whereby the drill bit may be quickly screwed up to the work or returned as desired.

The rapidity with which the spindle can be moved forward



COOK TRACK DRILL.

or back, renders it unnecessary to collapse the drill, except when trains are actually passing on the track.

This track drill is marketed by the H. A. Rogers Company, No. 19 John Street, New York, N. Y.

Building Material Preservative.

The efforts set forth to produce a preservative for iron and steel structures as well as railroad equipment against corrosion caused by the action of fumes, salts, and acids, are meeting with unusual success. In cases it has been found practically impossible to obtain paints or coatings that will adhere to some materials on account of the irregularity and condition of the affected surface. The Century Preserve Co., 823 Home Insurance Bldg., Chicago, Ill., has recently marketed a very valuable preservative for various construction materials, such as metal, wood, concrete, etc., and is claimed to be superior to paint in its power to resist moisture as well as having the peculiar condition of being chemically at rest about 24 hours after application, thus not being affected by the action of fumes, salts, acids, or alkalies. It also resists the action of brine and salamoniac, and if properly applied will not blister, crack, scale, or chip. It contains no oil or turpentine and when applied in thin solution will respond to capillary attraction in a way that will penetrate crevices where water often will not permeate. It may be used as a dip for iron and steel, as well as to spray surfaces and when applied thickly it adjusts itself to the expansion and contractions of metals without abrasion.

Extreme weather conditions have no effect upon its physical properties and is second only to glass in its non-conductive properties as well as protecting metal structures from electrolysis.

Loss By Fire.

The Indianapolis Switch and Frog Co., Springfield, Ohio, lost by fire on April 23rd, the entire main building of the machine department, with the exception of the walls. This building was 400 feet long by 225 feet wide, and will be rebuilt at once with fire proof construction. There was practically no loss of material or work in course of erection, and temporary arrangements are made to complete as fast as possible, unfinished orders. It is hoped that in the near future they will resume operations on a larger scale than before, restoring such equipment as was not seriously damaged and replacing and adding such new machinery and facilities that will be necessary for the equipment of a modern plant. It is expected that the increased facilities will enable them to handle their orders with much more rapidity than previous.

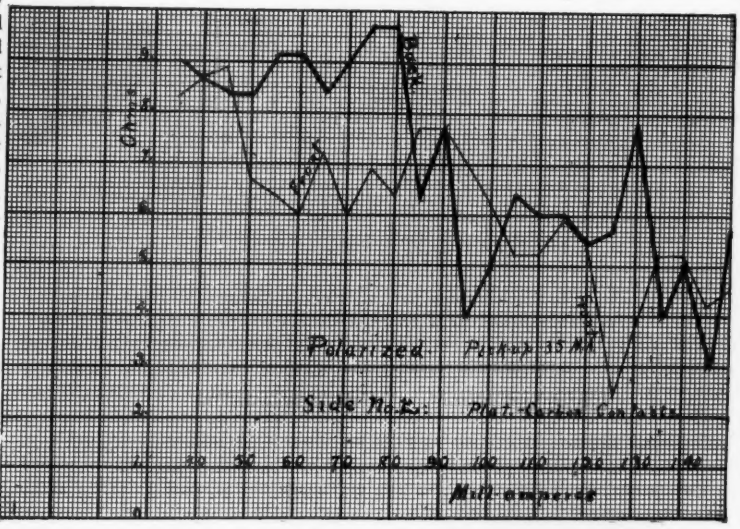
A Mercury Contact Relay

Among the exhibits that attracted considerable attention at the Railway Engineering and Maintenance of Way convention recently held in Chicago, was that of the McClintock Manufacturing Company, of St. Paul, Minn. It consisted of a display of their track relays for railway signaling and offered a relay that makes contact with the immersion of platinum into mercury. The problem of producing a relay that would be both sensitive and reliable under all conditions as well as make contacts through mercury is one that until recently has puzzled engineers. This was accomplished by the use of a ring made of glass tubing and having platinum points sealed into it. Sufficient mercury was introduced to cover both points, exhausted the air, and finally the ring is sealed. Circuits are opened and closed by rotating the ring on a shaft, thus causing the platinum to dip down into or rise up out of the mercury, according to the direction of rotation. The rotation is secured by means of the usual electro-magnets and armature. Contacts made in this way have extremely low resistance, are free from oxidization, cannot be made inoperative by the accumulation of dust or dirt, and cannot fuse together.

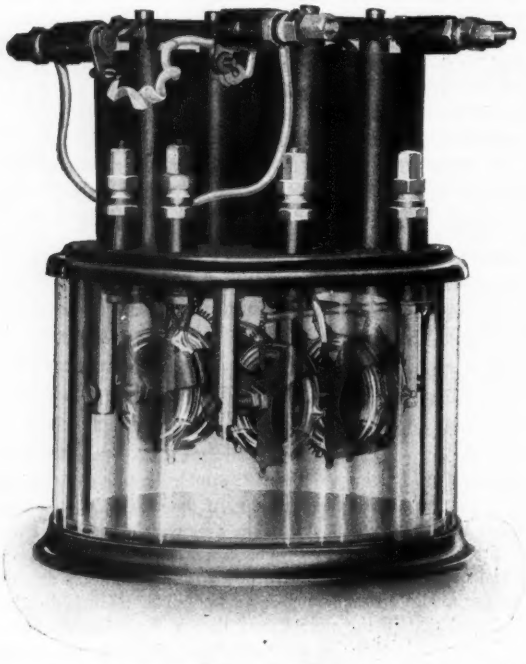
Another important feature of the mercury ring is its unusually long life, even where the relay is called upon to handle 110 volt circuits. One relay displayed had made over 400,000 operations, breaking 1 ampere on 110 volt circuit, and is equivalent to 100 operations a day for over 10 years. By arranging the contacts in series or multiple with proper resistances according to the requirements of the case, much heavier currents can be taken care of.

The resistance of carbon-platinum contacts presents some serious difficulties especially in the polarized relay. This resistance may be as high as 9 ohms and is frequently found to be between 1 and 2 ohms. The accompanying curve illustrates this effect. This means considerable loss of energy at the contact points. In the mercury contact the resistance is found to be less than 1/1,000 part of 1 ohm, including the leading in wires.

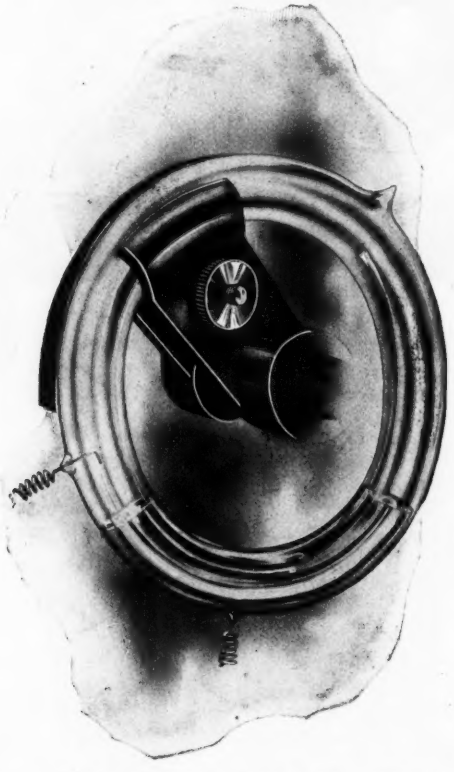
The annunciator relay, illustrated herewith, is used on single track lines where the annunciator must give indication when the train is moving in one direction, with no signal when the train is going in the opposite direction over the same track.



RESISTANCE VERSUS CURRENT CURVE—THE M'CLINTOCK SIGNAL RELAY.



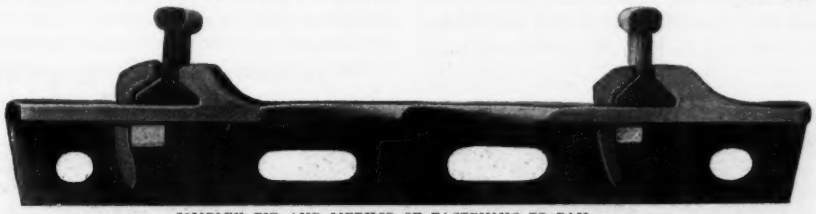
THE M'CLINTOCK SIGNAL RELAY.



MERCURY CONTACT RING SHOWING POSITION OF MERCURY AND CONTACTS ON OPEN CIRCUIT—M'CLINTOCK SIGNAL RELAY.

Simplex Metallic "T" Tie.

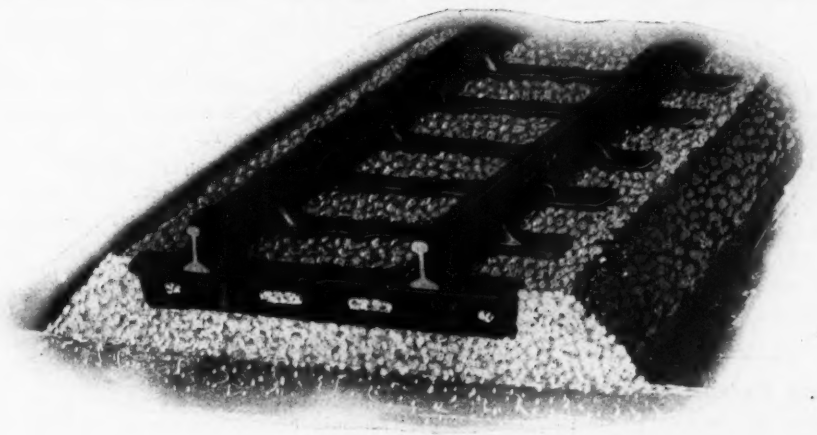
The denudation and inadequacy of the forests of the country to meet the demands of railroads for wooden ties have resulted in many experiments with various materials to find a substitute. When this subject is looked into with the degree of care that it unquestionably warrants it will not be in error to expect some form of metal tie to give permanency and stability of roadbed. The matter of fastening the rail to the tie has been a great drawback to the steel tie in the past, and now that other



SIMPLEX TIE AND METHOD OF FASTENING TO RAIL.

fastenings have been devised, the steel tie has received another impetus in its efforts to become extensively used.

Among the various forms of steel ties presented as a substitute for wood is the Simplex Metallic "T" Tie, represented by Mr. B. R. Kozlowski, 167 Dearborn street, Chicago, Ill. This tie is of simple construction, the rough castings direct from the steel mills are ready for the track. An accompanying illustration shows the interlocking device that acts as a rail fastener and brace and eliminates all danger of rail spreading. The only item



SIMPLEX TIE IN USE.

of expense is 125 pounds of casting material, with no machine work. The comparative cheapness of production and simple construction are its vantage points over other similar ties. Its life is of long duration and depends largely upon the rate of oxidation.

Miscellany.

Hatch Railway Signal Company, Port Huron, Mich, has been incorporated in Michigan with a capital stock of $10,000.

S. F. Bowser & Co., Ft. Wayne, Ind., have opened an office in Chicago at 210 Fisher building, in charge of James W. Runyan, assistant general manager.

The Cleanola Company, which was formerly located at 907 West Diamond street, Allegheny, Pa., has moved its general offices to the Fulton building, Pittsburg, Pa., and has opened an office at 553 West Van Buren street, Chicago.

F. W. Bird & Son, manufacturers of paroid roofing, East Walpole, Mass., has authorized the erection of a plant at Haverhill, Mass., but work will not be commenced for some time.

The Philip Carey Manufacturing Company, Lockland, O., has started excavation work in preparation for the construction of two large brick and concrete factory buildings, 80 feet wide by 400 feet long, which it expects to have ready for operation by September 1.

The Filley Automatic Railway Signal Company of Detroit, Mich., has been organized under the laws of Michigan with an authorized capital of $125,000, and the stock is now being offered to investors. The officers are: President, John Harper, Detroit; vice-president, W. S. Filley, Toledo, O.; treasurer, N. W. Kester, Detroit; secretary, Charles Walker, Detroit. The home office of the company is located at 125 Wayne street, Detroit, Mich.

J. S. Watson, Manager of the Link-Belt Company's drive chain department, sailed for Europe on April 25, where he expects to visit the chain-making plant of Hans Renold at Manchester, England.

The Steel Rail Supply Co., New York, is now in its new offices on the 15th floor of the United States Express Company's Building, 2 Rector street, New York.

The Goldschmidt Thermit Co., New York, has published a pamphlet describing some interesting welds made on steamships and locomotives. Some of the photographs included show unusually good cases of application of the thermit welding process.

The Illinois Central has nearly completed the erection of its large size copper telephone wires from Chicago to New Orleans and its other southerly terminals.

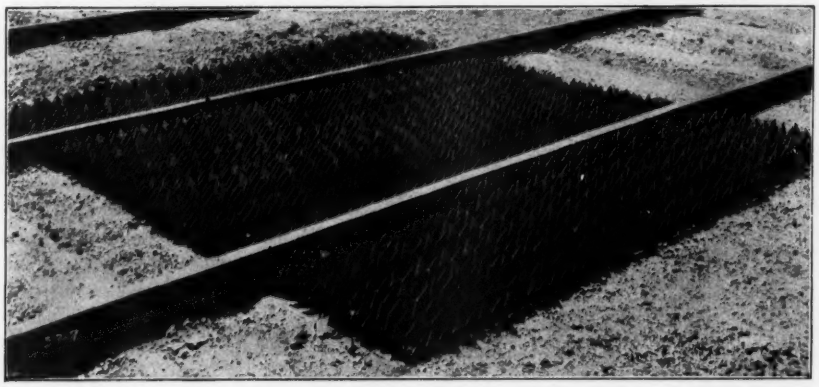
A new steel plant is under construction at Aliquippa, Pa., for the Jones & Laughlin Steel Company. The present plant of this company employs 10,000 workmen and has an output of 5,000 tons of steel a day, exclusive of the new mill, which will add materially to the amount of output.

"Spring Painting" is one of the latest publications of the Joseph Dixon Crucible Company, Jersey City, N. J. It is handsomely trimmed and illustrated in green, the appropriate spring color, and contains a deal of information in regard to paint and the action of climatic conditions on wood, iron, etc. A copy may be had upon request.

Abernathy Steel Cattle Guard.

The Standard Cattle Guard Co., Birmingham, Alabama, has placed upon the market a specially designed steel cattle guard comprising many desired features and one that is meeting with unlooked for success. It is in accordance with principles commonly used and embodies the use of bars parallel with the track, framed together in interchangeable sections, with no pockets in which moisture may collect. Thin edges are presented to the animal's foot and relied upon to deter stock.

The Abernathy steel cattle guard is made of four interchangeable sections. Each section is 8 ft. long, 26½ inches wide and 3½ inches high, and consists of 12 strips of No. 14 steel plate bolted together, and spaced 2¼ inches by thimbles. Each strip has 48 teeth bent alternately to the right and left, leaving no space between strips large enough for an animal's foot.



ABERNATHY STEEL CATTLE GUARD.

The outside strip of each section is one-half inch lower than the surface of the section, allowing guard to be placed close to gauge line of rail. The sections are spiked at each corner to the ties and are held fast by a lug of double thickness of metal so there is little danger of a dragging brake beam pulling up the guard.

Its simplicity of construction makes it easy to repair in case of accident or removal. Each section weighs 75 pounds and four compose a set.

Railway Extension in Mexico.

Railroads in Mexico and the southwestern part of the United States are realizing the possibilities in western Mexico and are beginning to extend their lines into that section. The Mexican Central Railway is extending its line to Manzanillo and Acapulco as well as the Southern Pacific Railway also building into that section. The latter company is now building a line from the port of Guaymas, the present terminal of the Sonora branch, south to the port of Mazatlan and thence to Guadalajara, where connection will be made with the lines of theMexican Central Railway. The new line will be nearly 800 miles long, and follows the Pacific Coast.

Boston & Albany Improvements

In accordance with the recommendations of the State Board of Railroad Commissioners, the Boston and Albany Railroad proposes to double track its line between Troy and Johnsonville, a distance of 16 miles. A block system is also to be established. The railroad company is also willing to abolish all of the 19 grade crossings between Troy and Lansingburgh, provided the state, the city of Troy and the towns along the line will pay their proportionate shares of the cost of the work. Should the grade crossings be eliminated the entire expense so far as the additional track is concerned, would be on the railroad company, but in regard to the existing track, the expense would be divided one-half on the company, one quarter on the state and one quarter on the municipality affected.

Technical Publications.

"Railway Signal Association, Volume No. 9, Proceedings for the Year 1906" is 6 by 9 inches and contains 342 pages of illustrations and written matter. Report of the annual and most important meeting held in Washington, D. C., covers alone over 200 pages and is devoted to discussion as well as necessary diagrams. Among the subjects dealt with in these proceedings are "Devices for keeping switches free from snow and ice." "Electric locking at electric interlocking plants." "Installation and maintenance of electric signal equipment." "Substituting track circuits for detector bars." "Upward inclination of the semaphore arm." "Optics of the signal lens." "Power distant signal, and a comprehensive plan for a complete system of signaling." This plan, together with discussion, covers about 30 pages. Mr. C. C. Rosenberg, Secretary Railway Signal Association, 12 North Linden street, Bethlehem, Pa.

"Railway Telegraph Superintends Association Proceedings of the annual convention held at Denver, Colorado, on June 20 and 21st, 1906. This report contains 125 pages and is 6 by 9 inches. Some of the papers discussed were, "Some points involved in the problem of increasing railroad facilities," by W. W. Ryder; "The Traffic of Railway Communication" by Frank F. Fowle, and "Overhead Crossing of Wires," by E. E. Parsons. The report is published by the association, Mr. P. W. Drew, Secretary, Wisconsin Central Railway, Milwaukee, Wis.

Air Brake Catechism. By Robert H. Blackall.—The twenty-fifth edition of this work is a thorough revision of the previous editions with additional chapters on the latest air brake equipment. The book offers a complete study of the equipment manufactured by the Westinghouse Air Brake Company, including the Schedule ET locomotive brake equipment; the K quick service triple value for freight service and the cross compound pump. The operation of all parts of the apparatus is explained in detail and a practical way of finding their peculiarities and defects with a proper remedy is given. It contains nearly two thousand questions with their answers, giving a detailed description of all the old standard and improved equipment and also all the necessary information to enable a railroad man to pass a satisfactory examination on the subject of air brakes. Two colored educational charts are included with the book giving the Westinghouse standard equipment for both passenger and freight locomotives and cars. The book contains 400 pages with over 130 illustrations.

Price $2.00. Published by Norman W. Henley Publishing Co., New York.